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THE RELATION BETWEEN THE LENGTH OF APHAKIC EYES AND THEIR APPROPRIATE CORRECTING GLASSES.

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MANY of the formulæ employed in ophthalmic practice are misapplied from a want of knowledge of the conditions on which they are based. In this paper I wish to draw attention to one formula the improper application of which has given rise to serious error. In the estimation of axial ametropia, of swelling of the fundus, or of the depth of a posterior staphyloma, we are all in the habit of using the convenient formula that a difference of 3 D corresponds to a difference of level of 1 *mm* in the fundus. If, for instance, when the surgeon is emmetropic, and the curvature of the patient's cornea is normal, the optic disc is seen distinctly with + 1 D behind the sight-hole of the ophthalmoscope, and a certain part of a retinal vessel is seen distinctly with + 12 D behind the sight-hole, the surgeon is justified in drawing the conclusion that the optic disc lies $\frac{1}{3}$ *mm* in front of its normal position and that the retinal vessel lies 4 *mm* in front of its normal position, or $3\frac{2}{3}$ *mm* in front of the level of the optic disc. If, however, the crystalline lens has been removed this conclusion is erroneous, as the dioptric system of the eye is in that case entirely different.

It will be convenient to consider the conditions on which this rule-of-thumb formula is based, and we shall be at once led to find the proper relation between the the length of an aphakic eye and its appropriate correcting glass.

If we take as our standard the simple reduced eye of Donders, in which the complex dioptric system of the eye is considered to be practically represented by a single spherical surface, whose radius of curvature is 5 *mm*, whose first principal focal distance f_1 is 15 *mm* in front of the cornea, the second principal focal distance f_2 being behind the cornea −20 *mm*, we get from the familiar formula

$$(p - f_1)(q - f_2) = f_1 f_2$$

the relation between the conjugate focal distances p and q. Here p represents the distance of the punctum remotum from the cornea, and q denotes the distance of the retina from the cornea, or the antero-posterior diameter in the reduced eye. Since q is measured behind the cornea it is of course a negative quantity.

Also if the eye be axially ametropic, $p - f_1$ denotes the focal distance of the glass necessary to correct the ametropia when it is placed at the first principal focus of the eye.

$$p - f_1 = \frac{f_1 f_2}{q - f_2} = \frac{(15)(-20)}{-l} = \frac{300}{l}$$

where l represents the excess or defect in length of the eye in millimetres.

Thus, suppose the eye be 3 *mm* too long, $l = +3$ *mm*

$$\therefore\ p - f_1 = \frac{300}{3} = +100 \text{ } mm$$

A lens, therefore, the focal distance of which is + 100 *mm* (or − 10 D lens) will be required to correct this eye for distant objects.

If x denote the power in dioptres of the correcting lens placed at the first principal focus of the eye

$$\frac{1000}{-x} = p - f_1 = \frac{300}{l}$$

$$\therefore\ l = -\cdot 3\, x \text{ and } x = \frac{-l}{\cdot 3}\ {}^{*}$$

Now in an aphakic eye if the corneal curvature is normal ($r = -7.829$ *mm*) $f_2 = -31.095$ *mm* $f_1 = 23.266$ *mm*.

$$\therefore\ p - f_1 = \frac{f_1 f_2}{q - f_2} = \frac{(23.266)(-31.095)}{-l'} = \frac{723.455}{l'}$$

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* If the complex dioptric system of the eye be taken into account, a more accurate expression for the power (x) of the correcting lens 13·7451 *mm* in front of the cornea is given

$$\text{where } x = \frac{-l}{\cdot 321} = -3{\cdot}115\, l, \text{ and } l = -\cdot 321\, x$$

where l' represents the excess or defect in length of the eye above or below 31.095 *mm*, which is the antero-posterior diameter of the emmetropic aphakic eye.

And $p - f_1$ denotes the focal distance of the correcting glass placed at the first principal focus of the eye required to correct this excess or defect. If X denote the power in dioptres of the correcting glass placed at the first principal focus of this aphakic eye

$$\frac{1000}{-X} = p - f_1 = \frac{723.455}{l'}$$

$$\therefore l' = -\cdot 723455\,X, \text{ and } X = \frac{-l'}{\cdot 723455} = -1\cdot 38226\,l'$$

If an eye of normal length (22.8237 *mm*) be rendered aphakic by the extraction of its crystalline,

$$l' = 22.8237 - 31.095 = -8.2713\ mm$$

The correcting glass for distance after the operation will be

$$X \text{ or } (-1.38226)(-8.2713) = +11.5\ D$$

if placed about 23 *mm*, in front of the cornea. A neuritis which in an aphakic eye causes + 3 D of swelling, would represent a displacement forwards of about 2.17 *mm*, whereas in a normal eye + 3 D of swelling would indicate a displacement of barely 1 *mm*.

Again suppose a myopic eye be 31.1 *mm* long,

$$l = 31.1 - 22.8 = +8.3\ mm\ ;\ x = -3.115\ l = -25.85\ D$$

Thus a myope who has been using — 25 D or — 26 D glasses may be expected to see without glasses if his crystalline lens is removed. Surprise has often been expressed at the very great change in refraction after extracting the lens in myopic cases. It will be noticed that the change in refraction due to the operation increases with the previous degree of axial myopia.

Ant.-Post. Dimension.	x	l	l'	X	Change of Refraction.
23 *mm*	− ·5 D	+ ·1763	− 8·095	+ 11·2 D	11·7 D
26 *mm*	− 9·9 D	+ 3·1763	− 5·095	+ 7· D	16·9 D
29 *mm*	− 19·2 D	+ 6·1763	− 2·095	+ 2·9 D	22·1 D
32 *mm*	− 28·5 D	+ 9·1763	+ ·905	− 1·25 D	27·3 D

This point is of considerable importance to those who treat high degrees of myopia by the extraction of the transparent lens. If the result of the operation does not correspond with this table, it is certain that the myopia was not purely axial in character. Incidentally I may point out that in aphakic eyes provided with the necessary correction 23 *mm* in front of the cornea, the retinal images are 1.5 times larger than in normal eyes. This is distinctly advantageous to the patient but should warn us against forming too favorable a view of his visual acuity when examining him with test types.

I lay no claim to any originality in the formulæ here given. They follow immediately from the data which may be found in the standard books on physiological optics, such as those of Helmholtz, Donders, and of Landolt. The numerical values of the constants used in this paper are those given by Landolt. The frequency of error arising from an improper application of the rule about normal eyes to the length of aphakic eyes justifies, I trust, this brief reference to the essential difference between the two conditions.

THE GRADUATION OF THE SQUINT OPERATION.

BY DR. EDM. LANDOLT, PARIS.

Translated from MS. by Dr. C. ZIMMERMANN, Milwaukee, Wis.

THIS article was suggested by the discussion on the same subject at this year's meeting of the British Medical Association (at Carlisle) in which I had the honor to participate. Dr. Maxwell, of Dublin, opened the discussion with his very interesting paper, from which I received the impression that the so-called classical rules for graduation in squint operations can hardly be further maintained. In my opinion, we cannot speak of obtaining a certain effect by graduation in squint operations, until the nature of strabismus and the action of the operation for it are better understood. For even our knowledge of the physiology and anatomy of the ocular muscles is still insufficient. According to the theory of Donders, which is no doubt correct, concomitant strabismus is a *binocular* affection. Measurements of the ocular movements, as well as the direct inspection of the muscles during the operation, have showed that in strabismus *convergens* both *external* recti muscles and in strabismus *divergens* both internal recti have grown weaker, probably from want of proper use. This seems to call for *strengthening* the action of the weakened muscles in correcting the deviation, instead of weakening one or two healthy muscles by tenotomy: advancement of the external recti in strabismus convergens, and advancement of the internal recti in strabismus divergens. Nevertheless, tenotomy is still much in vogue, because it is easier than advancement, and especially because the effect of the two operations is not yet clearly understood. The centre of rotation of the eyeball has been supposed to be immovable, so that after tenotomy the eye must turn about the centre in an opposite direction, and after advancement in the direction in which the muscle acts. Thus the result of either operation was held to be materially the same, viz., decreased mobility in the direction toward the tenotomized muscle or in the direction away from the advanced muscle, and increased mobility in the direction of the advanced muscle and in the direction of the rectus antagonizing the tenotomized muscle.

This view, however, is incorrect. The centre of rotation is by no means a fixed point in space, but its location is due to the resultant effect of all the forces which hold the eyeball in position and which move it. Of these forces, some, such as the recti, retract the eyeball, while others, holding these in check, draw the eyeball forward. If the action of the former is weakened as by tenotomy, the latter gain ascendency and draw the eyeball forward. For this reason the tenotomized muscle re-attaches farther back on the ball. This retraction of the insertion of the muscle is, however, in greater degree due to the rotation which the eyeball undergoes from the contraction of the antagonist muscles. We also do not take sufficiently into account the fact that the tenotomized muscle itself contracts more than its antagonist since it is stronger. This is the third reason why the new insertion of the tenotomized muscle falls far behind the normal insertion, thus lessening its effect on the mobility of the eye.

The effect of the muscle is lessened, however, from still another reason. The measurable excursions of the eyeball, the borders of the field of fixation, do not, as supposed, represent the total rotation which the muscles can impart to the eyeball. Their contraction is actually interfered with by strips of connective tissue ("check-ligaments," "*Hemmungsbänder*" "*ailerons*," "*tendons d'arrêt*") which arise from them and run toward the orbital margin. These ligaments follow the muscle. After tenotomy the ligament recedes also. Thus its checking influence will set in earlier.

From all these considerations it may readily be conceived how much the mobility of the eyeball must suffer after tenotomy. The diminution of the ocular movements is revealed by the contraction of the field of fixation and the lessened range of convergence. Indeed the success of tenotomy depends on the decreased mobility, as is conceded by the advocates of this operation.

They are deceived, however, first, in regard to the effect of tenotomy on the antagonist muscle, since they think that the antagonist gains what the tenotomized muscle loses, which is not the case. From the exposition of the mechanism of tenotomy given above, it follows that the antagonist never gains, if it gains at all, as much as the divided muscle loses. The eye, by the operation, is drawn forward out of the muscle cone, so that the muscles embrace it less than before. Therefore their influence upon rotation is lessened, as may be proven by measuring the excursions and the symmetrical movements of the eyes after tenotomy. Secondly, the assumption is wrong, that advancement has the same effect, and that it is therefore open to the same objections as tenotomy. On the contrary, advancement forces the eye deeper into its motor apparatus and the muscles embrace it more extensively. With the resulting increased contact the effect of the muscles on the mobility of the eyeball is increased. The check-ligament is advanced also with the muscle, and its checking action comes more into play. The field of fixation shows a considerable extension on the side of the advanced muscle, *without limitation* on the side of the antagonist. This is not surprising, since the latter remained unchanged. The opinion is general that a muscle loses power if its antagonist gains power, from the increased resistance of the latter. This resistance does not become active except through contraction of the muscle, which follows an impulse of innervation. Suppose the left externus to have been advanced. In looking to the right the internus is chiefly innervated and the externus relaxed, so that the function of the internus is perfectly free, the increased power of the externus being only perceived in the movement to the left. Thus the convergence increases after advancement of the internal, the divergence after advancement of the external muscles, without limiting the function of the antagonists. Herein lies the advantage of advancement over tenotomy. In twenty years' practice we have never had an over-correction after advancement, which is frequent after tenotomy. We have never produced a strabismus, which can hardly be avoided after tenotomy, at least in the secondary position. The advancement has also the cosmetic advantage of not causing annoying protrusion of the eyeball, sinking of the caruncle, or exposure of the sclera. So much for strabotomy in general.

As to the graduation of its effect, we meet with many errors and illusions. We can hardly regulate the re-insertion of a divided or advanced muscle on the globe, nor does the action of a muscle depend merely upon its attachment to the eyeball. For we learn from daily observation, that the effect of an operation on the mobility of the eye and the synergy of both eyes, *i. e.*, the correction of the strabismus, may be very different. We cannot graduate the effect during the operation. Nature does it: with us, if we make use of its efficient help; against us, if we neglect it. In the first place, the operation aims at the removal of an impediment, which nature alone cannot effect. But this is not all. We must resuscitate, strengthen, and make use of the powers and influences by which nature regulates the associated movements of the two eyes, *viz.*, the association of convergence and accommodation, but principally *binocular vision.* In our opinion, the operation is only a stage in the complicated treatment of strabismus. The treatment must be governed by exercises for attaining binocular vision. Mydriatics, spherical, cylindrical, and prismatic glasses, and exercises for convergence and divergence are also useful for regaining a harmonious action of both eyes. Graduation in squint operations is effected by optical and orthoptic treatment. It is not possible during the operation, in which we must confine ourselves, to proceed more energetically, *e.g.*, to shorten the advanced muscles of both eyes by resecting the tendon in strabismus of high degree and long duration with little disposition toward binocular vision. (In the highest degrees a moderate tenotomy may become necessary some weeks or months after these two operations.) In strabismus of moderate degree, the muscles of both eyes must be advanced as far as possible without resection and tenotomy. The advancement of the muscle of one eye is scarcely sufficient in manifest strabismus; but the operation on the second eye may be postponed until the effect of the first operation has become permanent. Insufficiency of divergence, and particularly of convergence, is generally cured by unilateral advancement, when non-operative treatment does not suffice.

I have written much about the advantages of muscular advancement, and little in regard to my method of operating, since the success of the operation does not depend on its details, and since I wanted to avoid narrow discussions on such an important question as the principles of squint operation. If the insertion of a severed muscle is permanently brought as near to the cornea as possible, our aim is obtained. This can be done by more than one method.

The following is my method as practised at present, although I do not consider it the only right one, and I constantly strive to improve it. Conjunctival incision close and parallel to the corneal limbus. No conjunctival bridge for a meridional suture is left, since the muscle then generally becomes re-inserted not at the corneal margin but farther back, corresponding to the conjunctival incision. The conjunctiva is not detached far beyond the tendon. A small and somewhat flattened hook is passed under the muscle, either according to von Graefe's method or, better, after grasping the muscle with a pair of forceps[1] and cutting a small hole. In this manner the whole muscle is brought flat on the hook, whereas in the first mode the relaxed muscle may be folded or the hook may become entangled in Tenon's capsule or the muscular fibres. An assistant now draws the muscle forward and away from the globe with the hook, and the operator with the squint forceps grasps the muscle at a point about one third of its breadth from its margin, together with the surrounding connective tissue and Tenon's capsule, *behind* the hook, and then passes a fine curved needle through this entire fold. After this is done on both sides of the muscle, it is pulled up by the four threads and cut between the threads and the hook. The tendinous stump is detached close to the eyeball. This is a small resection, which enhances the effect of the advancement in moderate degrees of strabismus. In simple insufficiency or small degrees of strabismus, the muscle is detached without resection. In strabismus of high degree, the sutures are introduced far behind the insertion for a more extensive resection. This done, the operator sees if the sutures are well applied. If they are not, he re-applies them, which is very easy, since the inferior surface of the muscle is now exposed. Then one needle is passed a few *mm* through the episcleral tissue, close to the corneal limbus, above, while the other is passed similarly below, the muscular plane. The assistant grasps the eyeball over the antagonistic muscle with a fixation forceps and rotates it toward the muscle to be advanced. Thus the operator can tie both sutures without much traction on the enclosed tissues. It is advisable to half tie both sutures before completely tying one. Thus the preponderance of the first suture over the second is avoided. To prevent confusion, white silk is used for one and black silk for the other suture.[1] The muscle, with its covering conjunctiva, not unfrequently rests upon the corneal margin, where, of course, it cannot insert. If the advanced piece should encroach far on the cornea, it may be divided by a cut into two halves, as I have done it for years, and both halves will then lie at the corneal margin. Generally the advanced muscle retracts enough to furnish a more favorable insertion. After the sutures are tied, the eyes are irrigated with an aseptic solution and both are bandaged. In convergent squint the effect of the operation is increased by paralysis of accommodation. Therefore atropine is instilled into both eyes, as long as there is any tendency to convergence. Exclusion of light, rest, and occlusion of the eyes have the same effect. The binocular bandage remains at least five days, for the healing of the wound. In convergent squint it is re-applied for several days more, for the above reasons. Then it is replaced by correcting convex glasses. The sutures need hardly ever be removed before the sixth or seventh day. In divergent squint, accommodation and convergence assist the operation. As soon as the advanced muscles are firmly attached, one eye is left free. After one or two weeks the methodical exercise of convergence may be commenced. Some colleagues, who acknowledge the advantages of muscular advancement, complain that frequently the sutures cut through. In such cases the sutures have not been passed deep enough into the episcleral tissue. Or it may be the fault of the patient, who should lie quiet in bed for at least six days. Persons operated on for squint cannot be allowed to walk about. I think that every strabotomy, during the first days at least, requires a binocular bandage, rest in bed, and careful watching by the oculist and the attendants. It must be borne in mind, that the healing of squint is not so easily attained as some authors assert even at the present time. Then we need not be discouraged, as was an esteemed and experienced European ophthalmologist of the old school, who, at the International Congress at Washington, said that he had entirely given up the squint operation on account of the bad results he obtained.

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[1] I use a toothed forceps, the teeth placed obliquely to the axis (2 : 1).

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[1] The silk, No. 1, of C. F. Hartmann, in St. Gallen, Switzerland, seems to be very good. It is sold in sterilized tubes which are very convenient.

PHLEBOLITH OF A VARIX OF THE CONJUNCTIVAL VEINS.

By SWAN M. BURNETT, M.D., Ph.D., Washington, D. C.

(*With two figures in the text.*)

A PLUG in the cavity of a varicose vein with a deposit of calcareous or other earthy material in it, is known as a *phlebolith*. These bodies seem not to be very common in any part of the body, for by some authors they are not mentioned at all. Among the latest text-books in English I find the following references:

—Chiefly met with in the veins of the genitals of the pelvis, genital organs, and lower extremities.—Ashurst, 1893.

—Are unusually small and are formed most often in the clots lying behind the valves of varicose veins and in the branches of the pelvic plexus of veins.—Treves, 1895.

—Small rounded and often pedunculated masses enclosed in a fibrous sheath, and consisting mainly of phosphate of lime with small quantities of sulphate of lime and potash.—Moullin, 1893.

—Small hard concretions which have been called vein-stones or phleboliths have been observed.—American Text-Book of Surgery, 1895.

I have not been able to find any reference to them, in any of the more recent text-books on ophthalmology, as occurring in the eye. In fact, varices of the veins on and around the eye are not themselves common; I have seen only three or four in about twenty thousand recorded eye cases. Those

I have observed I have not been able to refer to any particular cause, and all the patients stated that they had been accidentally discovered long before presenting themselves for treatment.

In two cases it was affirmed that a gradual enlargement had been noted recently. Pressure from before backwards always emptied them; and a ligature applied at the base has sufficed to cure the cases which submitted to treatment.

The third case, however, was distinguished by features that have led me to report it in detail:

Mrs. S. E. S., a white married woman of thirty, presented herself on December 18, 1895, with a large varix of the conjunctiva occupying the cul-de-sac and running up on the conjunctiva of the ball to within a few millimetres from the corneal edge. She had first observed it thirteen years ago. It had remained stationary until within the last few months, since which time it has seemed to enlarge some. She had never had trouble of any kind with the eye. The relative size and position of the mass are shown in Fig. 1. In this case, I determined to attempt to dissect out the mass of veins with a view to examine its histological structure in detail. In this I was, however, only partially successful, for on examining it more carefully and attempting to evacuate it by pressure, I found a hard resisting body which prevented a collapse of the tumor. However, I proceeded with the dissection, and removed two solid bodies,—one oblong, 8 by 6 by 4 *mm*, the other almost globular, 1 *mm* in diameter. Both had perfectly smooth surfaces,

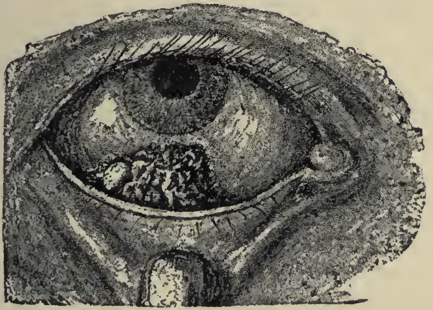

FIG. 1.—The largest white spot on the temporal side marks the site of the larger phlebolith.

and felt as hard as shot under the finger. On their removal the tumor collapsed completely. The conjunctival wound was brought together with a single fine suture. It healed readily, and in a few days there was no trace of it remaining.

The larger body was decalcified and cut by Dr. Gray at the Lionel Laboratory of the Emergency Hospital. A section is shown in Fig. 2. Its lamination is so regular as to lead one to think at once of a crystalline lens; and the idea is further carried out by its slope and a distinct capsule. The lens in that eye, however, was in place, and, besides, a careful examination shows essential distinction between the two. The capsule is much thicker than that of the lens, and the laminæ of the lens are not so continuous in any one section.

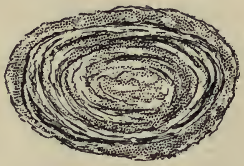

FIG. 2.—Section of phlebolith, magnified three diameters.

Why there should be a varix of the conjunctival vessels at all in a healthy eye is difficult to explain, since the conditions of over-pressure from gravitation and other large organs in its immediate vicinity, and which seem to be active factors in the production of varices elsewhere, are almost wholly absent. It seems most probable that they are congenital at the beginning, with an increase with advancing years. Given a dilated vein, however, with its retarded flow of blood, the formation of a plug by successive deposits of fibrin is easily understood, and its calcareous degeneration we know to be a natural sequence. The capsule of these masses I take to be the walls of the vein the lumen of which has become obliterated by the gradually encroaching mass.

A CONTRIBUTION TO THE STUDY OF MOLLUSCUM CONTAGIOSUM OF THE EYELIDS.[1]

By Dr. H. MUETZE, St. Louis, Mo.

(*With two drawings, Plates XVI. and XVII., Vol. XXXIII., Germ. Ed.*)

IT is not my intention to enter into a very minute description of the clinical symptoms of this so well-known tumor, as the subject has been thoroughly exhausted in the text-books and monographic literature of dermatology. If, however, I undertake to make a few remarks in an ophthalmological journal, it is because I regard molluscum contagiosum of special interest to the ophthalmologist. I seize the opportunity of considering this affection from a clinical as well as histological standpoint particularly, as the recent correspondence, between Steffan[2] and de Wecker,[3] has left the impression that molluscum contagiosum might not be as well known in ophthalmological circles as it really deserves.

Although molluscum contagiosum is briefly mentioned in the text-books of ophthalmology, yet a more accurate description of it is mostly wanting. Neither have I been able to find perfect microscopical illustrations in our literature. Fuchs[4] only gives a drawing of a tumor, designated, "Adenoma of the sebaceous glands," which seems to me identical with molluscum contagiosum. It may be sufficient to state that this benign, epithelial, mostly multiple tumor, which is not so very rare at all, may occur anywhere in the skin. It is found principally, however, on the genital organs and surrounding parts and in the face. In the latter, the *especial seat of predilection is the eyelid or the margin of the same.* Frequently the little tumor situated on the margin of the lid is so small as to be easily overlooked, and occasionally it is confounded with a simple wart, etc. Simon and Lewin[1] justly claim, that he who knows molluscum contagiosum is able to find it *frequently.* Even macroscopically, it is easily differentiated from tumors of the sebaceous glands (Milium, Atheroma, Retention cyst). Rarely larger than a pea, somewhat reddened at the base, otherwise of a whitish color, it forms a round elevation with the skin, which is stretched tightly over it. It is umbilicated and has a central aperture, from which on lateral pressure a gruel-like mass is evacuated, containing the so-called molluscum corpuscles. These corpuscles are considered by some to be the carriers of the contagium. For further information, I should like to refer to the text and illustrations in Hebra's *Atlas*[2] and to the description given by Simon and Lewin (*l. c.*) in *Eulenburg's Realencyclopaedia.*

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[1] From the Eye Clinic of the University of Marburg, Germany.

[2] *Klin. Monatsbl. f. Augenheilk.*, vol. xxxiii., p. 457 ; vol. xxxiv., p. 66.

[3] *Klin. Monatsbl. f. Augenheilk.*, vol. xxxiv., p. 64.

[4] Fuchs, *Arch. f. Ophthalm.*, xxiv., 2, p. 158, 1878.

As molluscum contagiosum does not occur so very rarely on the lid or the margin of the lid, it frequently is the cause of conjunctival catarrh, which defies all non-surgical treatment, as Steffan (*l. c.*) pointed out correctly in referring to Peters's[3] article on the subject. After removal of the tumor, the catarrhal trouble disappears, as we shall see from our three cases, reported farther on.

Now, whether molluscum contagiosum, situated on the margin of the lid, produces a local irritation in the conjunctiva, or whether the catarrh is due to the secretion of the tumor, possibly rubbed into the conjunctival sac by means of the fingers, cannot be decided at present. Both might be possible.

The contagiousness of this tumor was justly presumed by Bateman,[4] who first described it as molluscum contagiosum. Recently the truth of this supposition has been confirmed by experimental tests, as well as clinical observations. By intra-epidermoidal inoculations with the contents of molluscum contagiosum, Pick,[1] for example, produced the typical tumor in a boy and a girl after a period of incubation of ten weeks. After three to four months it had attained the usual size. Csokor[2] experimented successfully in a similar manner.

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[1] Simon and Lewin, *Eulenburg's Realencyclopaedia*, vol. xiii.

[2] Hebra, *Atlas d. Hautkranhh.* Text, p. 81 ; vol. vii., pl. x., Vienna, 1856.

[3] Peters, "Zur Behdlg. d. Bindehautkatarrhe Klin.," *Monatsbl. f. Augenheilk.*, vol. xxxiii., p. 370.

[4] Bateman, *Delineation of cutaneous diseases, etc., of the late Dr. Wilson*, London, 1817.

During two epidemics of molluscum contagiosum occurring on Staten Island, Mittendorf[3] made observations which prove the contagiousness of the affection beyond any doubt. Additional proof of the contagiousness of this disease is furnished in one of our cases by the anamnesis in such a drastic manner, that I cannot refrain from giving the exact history of this case first.

1. The patient, L. Apollonia, thirty-nine years of age, presented herself at the Marburg Eye-Clinic April 27, 1896, for the first time. Last year she was *nursing a sick child, which had a number of nodules on the right eye* since winter 1894–95; these were removed successfully in May, 1895. The child embraced and kissed her frequently, and four to six weeks after the child had taken ill, patient noticed *two little nodules at the margin of both lids of her left eye.* The nodules were situated precisely at the point of contact of both margins and continued to grow very slowly.

In August they were extirpated, and while the lower one never returned, the upper one gradually began to grow again until it attained the present size. Patient had a sensation of pressure and heaviness in the left eye; also lachrymation, and very frequently the lids were glued together. No nodules anywhere else on the body.

Stat. Præs.—General health good. Right eye normal. Left eye: On lower lid no distinct scar. At intermarginal portion a round whitish tumor, about the size of a pea, covered by skin, umbilicated and with central opening, from which, on lateral pressure, a gruel-like mass exudes. The little tumor is very sharply defined, and the lashes have been forced aside by it. The skin is only slightly reddened ; the conjunctiva a great deal more so. No similar formation on face and neck ; only a few comedones. Extirpation of the tumor.

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[1] Pick, "Ist Mollusc. contag. contagios.?" *Verhldg. d. deutsch. dermat. Gesellschft.*, 2d and 3d Congr., 1893, p. 89.

[2] Csokor, "Ueber Epithelioma contag. des Geflügels," *Wiener med. Presse*, 1883, p. 446.

[3] Mittendorf, "Two Epidemics of Mollusc. Contag.," *Trans. of the Amer. Ophth. Soc.*, 22d meeting, New London, p. 262, and *Amer. Jour. of Ophth.*, p. 298.

2. The second case concerned a twelve-year-old boy, who had been suffering with severe conjunctival catarrh in his right eye for several weeks. No knowledge of any possible contagion.

Stat. Præs.—In the centre of the margin of the right lower lid there is a prominent, sharply defined, superficial tumor about the size and form of a split pea. It is umbilicated, situated closely under the skin, with which it is continuous in the centre, showing here a small opening, from which, on pressure, the gruel-like contents are evacuated. A number of similar small tumors are on forehead, cheeks, and chin in different stages of development. Lower conjunctiva considerably congested and swollen ; partial ectropion.

No improvement by three weeks' treatment with the usual remedies ; immediate disappearance of the catarrhal trouble, however, after extirpation of the tumor.

3. The third case was that of a young man twenty years of age with a small tumor on the right upper lid. In this case also the troublesome conjunctival catarrh subsided only after removal of the tumor. There are several smaller tumors in the skin of forehead. By these three cases, therefore, we prove that, as we assumed above, molluscum contagiosum *is liable to produce conjunctival catarrh of varying intensity, which only yields to the removal of the tumor.*

HISTOLOGICAL EXAMINATION.

The contents pressed out of the tumors contained, besides horny epithelial scales, numerous oval, strongly light-refracting, sharply defined corpuscles, partly grouped in a honeycomb-like framework, partly free. These proved very resistent to reagents.

The tumors themselves were hardened partly in corrosive sublimate solution and subsequently treated with iodine-alcohol, partly in a ten-per-cent. solution of formol, and afterwards imbedded in paraffine with melting point at 40° R. The sections of 10–15 μ were stained with borax-methylene-blue and hæmatoxyline-eosine. With borax-methylene-blue the normal cells stained intensely blue, the partly degenerated cells considerably less so, and the totally degenerated cells (molluscum corpuscles) did not take any stain at all. With hæmatoxyline the nuclei and cornified cells stained dark blue; as a counter-stain eosine was used, which colored the normal-cell protoplasm pink, the partly degenerated cells a little darker, and the totally degenerated cells (molluscum corpuscles) assumed a dark red color.

FIG. 1 (Leitz Obj. 2, Ocular 3. Tube length 170 *mm*).—This illustration represents a longitudinal section through the centre of the tumor, stained with borax-methylene-blue. It is of a somewhat round, lobular, gland-like shape, and surrounded by a pretty tense connective-tissue capsule. The latter sends processes or septa irregularly into the tumor. Some of these septa can be traced close up to the central aperture; others, being cut transversely, are closed and in this manner a peculiar lobulated appearance is imparted to the whole. To judge from the present section, we therefore must assume that the tumor is imbedded in a number of connective-tissue pockets of different size, which take their origin from the thick connective-tissue capsule and extend into close proximity of the central opening. In this tense connective tissue we find numerous leucocytes, especially in the neighborhood of the transversely cut blood-vessels and the papillæ. On both sides of the section there is surface epithelium, the lowest layers of which are directly continuous with the lower epithelial layers of the tumor, whereas the upper layers, running farther forward, are lost in the interior of the central aperture. In entering the tumor from without we notice, on the connective-tissue capsule and the septa arising therefrom, several layers of normal surface epithelium, which towards the centre of the tumor gradually loses its characteristic properties. The individual cells, in the beginning stained dark blue and regular, are arranged more irregularly and have assumed a lighter tinge; with the exception of the nuclei, however, which appear normally stained and crowded to the periphery. Besides, the cells are larger and of various shapes. The farther we follow them to the centre, the larger and lighter they are; the nuclei remain visible in crescent form in the periphery. Finally we find them oval and colorless in the central aperture, imbedded in an intercellular substance.

This transition, *i. e.*, the development of the molluscum corpuscles, can be studied to greatest advantage in Fig. 2 (Leitz Obj. 7, Ocular 1. Tube length 170 *mm*).

This illustration represents a longitudinal section through a lobe of the tumor, stained with hæmatoxyline-eosine. Within, the lobe is covered by several layers of perfectly normal surface epithelium, in which the protoplasm has stained light pink and the nuclei dark blue. In some of the cells lying farther inward, the protoplasm has stained a little darker on one side of the nucleus and assumed a granular appearance. The nucleus is not quite in the centre of the cell and on one side seems pressed in by the darker mass. In the following cells a still more marked degeneration of the protoplasm can be noticed. The cells are somewhat swollen ; the central protoplasm is broken up into small round masses, while the peripheral protoplasm is normal. The nuclei are pushed still more to the periphery by the degenerative product ; the nucleoli are clearly visible. Farther in, the cells are swollen considerably ; the protoplasm has degenerated entirely and formed larger round masses. The nuclei are crescentic and pushed considerably to the periphery ; the nucleoli can still be recognized distinctly. Scattered between the degenerated cells we find normal-looking nuclei and very fine eleidine granules, stained dark blue ; these are the product of non-degenerating, but normally cornifying cells. In the adjoining cell-mass the nuclei appear only as dark stripes in the periphery of the cells and in the next layer they disappear entirely. Here we also notice a great number of cornified epithelial cells ; the membrane of the degenerating cells begins to cornify also, and the protoplasm has formed large round lumps. In the following layers the cornified epithelial mass forms a honeycomb-like framework, stained dark blue, in which the totally degenerated cells, representing the molluscum corpuscles, are loosely suspended. The farther the cells have advanced in degeneration, the darker they have stained with eosine, until at last the finished molluscum corpuscles have assumed a dark-red color.

Although the contagiousness of molluscum contagiosum must be considered an undoubted fact, yet no one has ever succeeded in isolating the contagium with certainty. Neither has it been proven whether the tumor takes its origin directly from the surface epithelium, from a sebaceous gland, or from a hair follicle. Virchow[1] and Thin[2] hold that the cellular hyperplasia begins in a hair follicle, Wedl and Bock,[3] as well as Kaposi,[4] allow the tumor to arise from a sebaceous gland, whereas Bizzozero and Manfredi,[5] Simon,[6] Neisser,[7] Caspary,[8] Kromayer,[9] and others allow it to originate from the surface epithelium. I am inclined to join the latter view, for in a number of sections I have observed, alongside of the tumor, a marked hyperplasia, especially of the lower epithelial layers, so as to make the papillæ appear incarcerated between the different epithelial invaginations. It made the impression upon me, as if the cells had grown down into the tissue and the papillæ later formed the abovementioned connective-tissue pockets which in section appear as septa. Thus the connective-tissue capsule would have been produced by the resistance offered to the tissue by the growth, which would also account for the elevation of the tumor above the level of the normal skin.

Great diversity of opinion existed in regard to the nature of the contagium and the so-called molluscum corpuscles. Virchow (*l. c.*), Caspary (*l. c.*), Lesser,[10] and Kromayer (*l. c.*) consider the molluscum corpuscles vesicular formations, originating from a metamorphosis of the cell protoplasm. According to Bollinger[11] and Neisser (*l. c.*), molluscum contagiosum is produced by a monocellular zoöparasite.

Bollinger (*l. c.*) looks upon the molluscum corpuscles as gregarines; Neisser (*l. c.*) designates them as epithelial cells, filled with gregarines. Török and Tommasoli[12] think it probable that moll. contag. contains sporozoa, but don't look upon the molluscum corpuscles as parasites. Rieder[13] and

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[1] Virchow, *Arch. f. pathol. Anatomie*, vol. xxxi,, p. 144–154.

[2] Thin, The History of Moll. Contag., *Journ. of Anat. and Phys.*, vol. xvi. p. 202.

[3] Wedl and Bock, *Path. Anatomie des Auges.*

[4] Kaposi, *Vierteljahrschr. f. Derm. und Syph.*, 1877, p. 333.

[5] Bizzozero and Manfredi, *Vierteljahrschr. f. Derm. und Syph.*, 1871, p. 599.,

[6] Simon, O., *Verhdl. d. physiol. Gesellsch. zu Berlin*, 1876, No. 3.

[7] Neisser, O., *Vierteljahrschr. f. Derm. und Syph.*, vol. xv., iii., p. 553.

[8] Caspary, J., *Vierteljahrschr. f. Derm. und Syph.*, vol., ix., ii., p. 205.

[9] Kromayer, *Virchow's Arch. f. path. Anat.*, vol. cxxxii.

[10] Lesser, E., *Lehrb. d. Haut. u. Geschlechtskr.*, vol. i., p. 244, Leipsic, 1894.

[11] Bollinger, *Bericht d.* 51, *Versam. deutsch. Naturf. und Aerzte*, Cassel, p. 159.

[12] Török and Tommasoli, *Monatsh. f. prakt. Derm.*, 1893, No. 4.

[13] Rieder, *Münchener med. Wochenschr.*, 1893, p. 55.

Csokor (*l. c.*) hold that the tumor is of a parasitic nature. Csokor thinks that the molluscum corpuscles bear close resemblance to the parasite, described by Leuckhardt as coccidium oviforme.

My researches have given no satisfactory results in regard to the nature of the contagium producing the tumor. The view, however, that the molluscum corpuscles themselves are parasites, I consider decidedly erroneous, for in all my preparations I have been unable to detect the least proof which would favor such a possibility. The development of the molluscum corpuscles can be traced very accurately in Fig. 2. According to my opinion they are the product of a peculiar cell-degeneration, very likely due to the contagium, as it has been observed by Virchow, Caspary, Lesser, and Kromayer. In one respect, however, my observations differ from those of Kromayer. Kromayer claims that the degeneration of the cell begins first in the nucleus, which swells and forms a granular mass with the protoplasm. In all my preparations I was able to state (especially by counter-staining), as is also shown in Fig. 2, that the degeneration of the cell begins in the protoplasm, close to the nucleus, and progresses in the manner described above.

The result of our clinical and microscopical examinations would be as follows:

1. Molluscum contagiosum of the lid, or the margin of the lid, is not rarely the cause of conjunctival catarrh.
2. Molluscum contagiosum is undoubtedly contagious.
3. The molluscum corpuscles are to be considered the product of a peculiar degeneration of the epithelial cells, caused by the contagium.
4. The degeneration begins in the protoplasm of the cell itself and not in the nucleus of the cell.[1]

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[1] Before I had finished the translation of this article, Dr. A. Alt, whom I presented with several sections of the tumors, published[2] an article, in which he refers to the histological examination of several tumors, described by him in 1877[3] as xanthelasma tuberosum palpebræ. Dr. Alt is correct in stating that, as far as the histological appearance of our preparations is concerned, they are positively identical. Dr. Alt believes that the tumors take their origin from the sebaceous glands.

[2] Dr. Adolf Alt, "Xanthelasma Tuberosum or Molluscum Contag.," *Amer. Jour. of Ophth.*, vol. xiii., No. 11.

[3] Dr. A. Alt, "Xanthelasma Tuberosum Palpebræ," ARCH. OF OPHTH., vol. vii., p. 366.

Explanation of the Drawings.

Plates XVI. and XVII., Vol. XXXIII., Germ. Ed.

FIG. 1.—Section through molluscum contagiosum of the margin of the lid, vertical to surface of skin. Lobular structure, cell degeneration towards central aperture.—Obj. ii., Oc. iii.

FIG. 2.—Gradual transition from normal basal epithelium to molluscum corpuscles. Degeneration of protoplasm. Obj. vii., Oc. i.

I beg to express my gratitude to Prof. Uhthoff for the permission to publish the above case, and to Dr. Axenfeld for his suggestion to work it up, as well as for his assistance in the microscopic examination.

A COMBINED AGE AND REFRACTION SCALE.

By Dr. A. E. PRINCE, of Springfield, Ill.

(*With 2 drawings in the text.*)

I WISH to present to your readers a combined age and refraction scale, which has been made at my suggestion, and which is designed to enable the oculist and optician to ascertain the accommodation of one eye or both, with the greatest degree of precision and with the least possible loss of time, and furnish a direct comparison between the accommodation of the patient and the normal accommodation as established by Donders.

To accomplish this, a ruler (Fig. 1) is made fifty centimetres long, bearing in the centre an age scale parallel to which is a dioptric scale showing the corresponding accommodation for each year of life. This ruler is supplied with a slide (Fig. 2), carrying test type, the smallest corresponding to 0.25 Snellen, and which should be read distinctly by the normal eye at twenty-five centimetres or less.

The age being known, the first point to be ascertained is the punctum proximum expressed in dioptries. To ascertain this, the patient is required to accommodate for the nearest point at which he can see the finest print absolutely distinctly, when a glance will show whether the position of the punctum proximum is normal, or situated nearer or farther from the eye than the point indicated by the age of the individual as shown upon the age scale.

If nearer, it would indicate the presence of myopia, a low degree of myopic astigmatism ; if farther, it would indicate the presence of hypermetropia, hypermetropic astigmatism in a low degree, or the impairment of accommodation due to some pathological condition.

In the absence of any pathological lesion, the amount of error will be approximately indicated by the interval on the dioptric scale between the punctum proximum and the number corresponding to the age of the patient. This observation will often reveal latent hypermetropia in cases where it is not suspected, which will prove of value, especially in middle life, when the employment of a mydriatic is often undesirable.

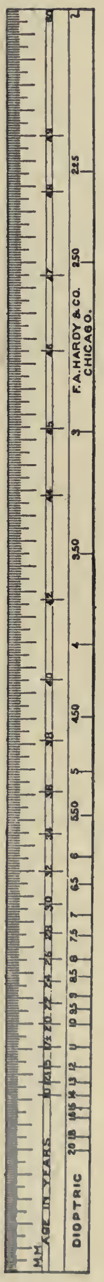
To ascertain the punctum proximum, when the test type cannot be distinguished, observe the following:

Employ a plus glass with which 0.25 Snellen type can be distinctly read, and subtract the strength of this glass from the number of dioptries corresponding to the artificial punctum proximum; when found the result will be the true punctum proximum, which will be a minus quantity, when the error is so great as to distort distinct vision.

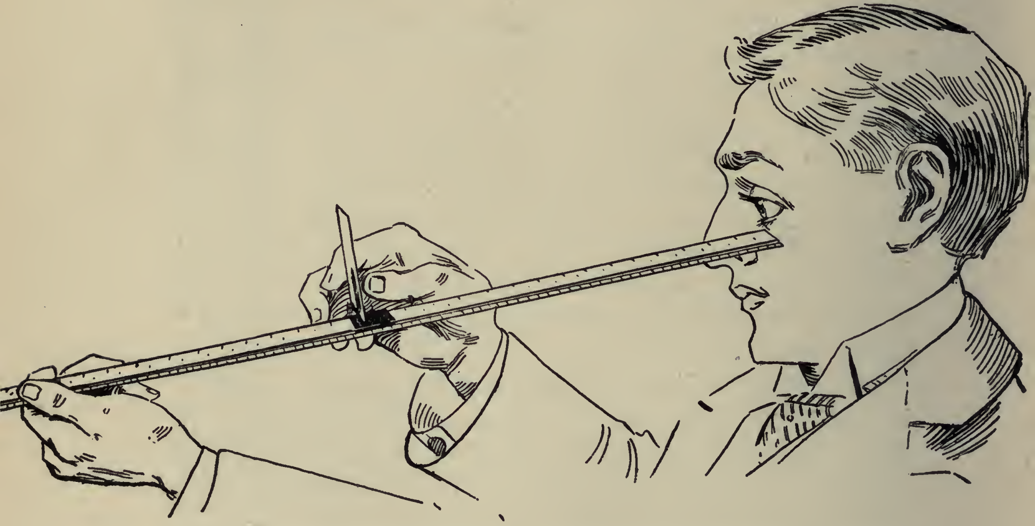
This will occur in hypermetropia of high degree in young persons, and a correspondingly low degree in presbyopia. The amount of error will be found as before by subtracting the punctum proximum expressed in dioptries from the number on the dioptric scale corresponding to the age of the individual.

In case the type cannot be seen by the aid of a convex glass, impaired vision due to astigmatism or some form of amblyopia will be inferred, and must be diagnosed by appropriate means.

To ascertain the age of the individual, by means of the loss of accommodation, which progresses uniformly with advancing life, and is little affected by race, sex, or environment, it will first be necessary to determine the amplitude of accommodation.



To determine this in the emmetropic eye, it is only necessary to note the number on the dioptric scale corresponding to the punctum proximum. If hypermetropia or myopia be present, the amplitude of accommodation will be found by adding the former to, or subtracting the latter from, the number on the dioptric scale corresponding to the punctum proximum. The amplitude of accommodation being known (in the absence of any pathological condition), the approximate age of the individual will be found opposite the corresponding point on the age scale. Conversely, the discovery of any impairment of the amplitude of accommodation would lead to the suspicion of pathological changes, and prompt a thorough intra-ocular examination.



Having determined the amplitude of accommodation, the reading glass required by the presbyope will be approximated by subtracting fifty per cent. of the amplitude of accommodation from the reading distance expressed in dioptries, and adding the error of refraction.

I have used one of these scales of my own construction for some time, and have found it very convenient. I also found that I measured the power of accommodation much more frequently than before having such a scale at hand,

and these tests resulted in some discoveries which might otherwise have been overlooked.

This led to the conviction that tests for the measurement of accommodation would be less likely to be neglected if such an instrument were in the possession of the profession, and accordingly I have requested F. A. Hardy & Co., of Chicago, to furnish a ruler having four scales, namely, a dioptric scale, an age scale, a millimetre scale, and an inch scale. This ruler is made of hard wood, and finished with a white enamel surface, and will be found a creditable addition to the armamentarium for the examination of refraction and accommodation.[1]

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[1] To be obtained from F. A. Hardy & Co., 46 and 48 Madison Street, Chicago, Ill., for $1.25.

THE USE OF CICATRICIAL SKIN-FLAPS IN THE OPERATION FOR ECTROPION.

By HAROLD WILSON, M.D., Detroit, Mich.

DE WECKER says that "blepharoplasty is one of those operations in surgery in which more work has been done with the pen and pencil than with the bistoury." Its literature and its practical application are therefore disproportionate; yet it is evident, from the history of the operation, that, notwithstanding all that has been written and done, the conditions under which cicatricial ectropion arises, and the principles to be observed in its correction, have not always been clearly perceived by those who have essayed operations for its relief. In spite of the comparative rarity of the condition, and the infrequency with which the surgeon is called upon to render assistance, its importance is such that its intelligent discussion can hardly become too voluminous, if only a better understanding is thereby secured.

In a recent article upon this subject,[1] the statement occurs that "it is the general belief that scar tissue should not be included in skin-flaps." An examination of several recent text-books,[2] which may be taken fairly to represent commonly accepted opinions, confirms this statement, for, although in none of them is there to be found a direct declaration to that effect, the indirect and inferred opinion is that cicatricial tissue is unfit for the formation of flaps. Now, that such a belief is often justified, is no doubt true, but that it is to be laid down as a general rule, is open to a serious debate.

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[1] Hotz, "A Method of Utilizing Cicatricial Skin-Flaps in the Operation for Ectropion of the Upper Lid," ARCH. OF OPHTH., vol. xxv., p. 293.

[2] Noyes, 1890; Norris and Oliver, 1893; Fuchs, 1892; De Schweinitz, 1892; Alt, 1893; Fick, 1896. Meyer, 1887, says: "The chances of success are all the greater the nearer the transplanted flap is to a cutaneous surface in all respects healthy and free from any inflammatory or cicatricial alteration."

One of the earliest attempts to relieve a cicatricial ectropion consisted in making a curved incision through the scar tissue of the lid, liberating and replacing the everted lid, and stuffing the wound with lint to keep it open, in the expectation that the lid would maintain its normal position after the wound healed. It was soon discovered that the effort was worse than useless, and the original deformity was likely to be increased.[1] The effort was then made to fill the defect left after liberating the lid, with pedicellate flaps of various kinds taken from the surrounding parts (Dzondi, 1815; Fricke, 1828; Jüngken, 1829; Dieffenbach, 1835, etc.), or from distant parts (Tagliacotius, sixteenth century), or with a non-pedicellate flap of skin (Le Fort, 1872; Wolfe, 1874), or with numerous small grafts of skin (Reverdin, 1869), dermo-epidermic grafts (Ollier), skin grafts in mosaic (De Wecker, 1872), or large thin epidermic grafts (Thiersch, 1874–1886), which brings the summary of methods down to the present time, omitting numerous minor modifications. None of these methods is without some value, and each has been successful in some cases.

In 1856, at a meeting of the Société de Chirurgie, regarding the question as to the use, in plastic operations, of pedicellate flaps taken from cicatricial tissue, the following conclusions were reached after a most thorough discussion:[2]

"1. When the cicatricial integument is thin, drawn, shining, very slightly vascular, entirely fibrous, adherent to the underlying bed, or separated from it by a very loose serous-like [succulent] tissue, it is not to be employed [in the construction of a flap].

"2. If, on the other hand, the cicatrix occupies only the superficial layers of a thick skin; if it is underlaid with a pannicle of fat, well nourished, of good vitality and without underlying adhesions, it may be used for the formation of flaps without hesitation.

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[1] *Mackenzie on the Eye*, Am. ed., 1855, p. 244, "at the end of some months, matters are probably rather worse than they were before the operation."

[2] *Bull. Soc. de Chir.*, 1856, vol. vi., p. 549 *et seq.*

"3. Even where the anatomical conditions are unfavorable we may use the cicatricial tissue, but only in a very limited way (*pour de très petits emprunts*).

"4. Cicatricial tissue may unite by first intention, either to other cicatricial tissue or to sound tissue.

"5. Cicatricial flaps are exempt from various inconveniences which accompany the use of flaps from healthy tissue. Thus, they lie flat, not riding up over the surrounding parts, and are not disposed, like the latter, to become puffy or softened in spots.

"6. If the face has been considerably disfigured by a large cicatrix, and if a portion of this surface is to be repaired, the lids, for example, it is advantageous, from a cosmetic point of view, to use cicatricial flaps. The employment of flaps of healthy tissue to make the new lid, leads to a disagreeable contrast with the surrounding parts, in some respects adding to the deformity already existing."

In the main these conclusions still remain valid; the experience gained since they were originally set forth, and the general progress which the art of surgery has made, have served rather to amplify and extend them, although the introduction of skin-grafting in 1869 rather turned the attention of surgeons away from the older methods. The adoption of antiseptic methods has rendered it easier to preserve the vitality of the transplanted flaps, and the preliminary treatment of scar tissue has made it possible to utilize much that formerly was considered unfit for use.

The changes which cicatricial tissue spontaneously undergoes were matters of very early observation. Mackenzie says[1]: "Contraction . . . gradually increases for some time after the process of cicatrization appears completed. . . . Matters then appear for a while to remain stationary, but in the course of years, the everted eyelid will have loosened itself a little from its unnatural situation. . . . In consequence of the mechanical motion to which the parts are subjected, a slight increase takes place in the flexibility of the cicatrized surface, and it becomes somewhat less firmly attached to the subjacent textures. The parts which were at first matted immovably together, give a little to the motions impressed upon them by external causes and the absorbents appear to contribute to this slight relaxation by removing some of the adventitious substance which bound down the integuments. This is all the return which is ever made to the natural state by the parts themselves." It was for the purpose of taking advantage of these natural changes in the character of scar tissue that Lawson laid down the following rule in the performance of blepharoplastic operations[1]: "Before attempting a plastic operation for the formation of a new eyelid, sufficient time should be allowed to lapse after the injury, for the skin in the neighborhood of the eye to have recovered as far as possible its healthy elasticity and softness. All thickening and induration of the subjacent cellular tissue should have passed away, and the skin should glide readily over the parts beneath it." In accordance with this principle, he relates a case in which fifteen months were allowed to elapse before an operation was undertaken.

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[1] Mackenzie, *loc. cit.*

In 1881, Bull,[2] proposed to bring about and increase the extent of these favorable changes in scar tissue by persistent massage. By this means "adhesions of scars, slight or extensive, to the subjacent parts have been slowly, cautiously, and painlessly detached, and a gradual absorption of the firm material in the dense parts of the scar has been brought about. . . . Depressed scars due to bone disease. . . . generally prove intractable to this method of treatment by massage." A case reported by Keyser illustrates the possibilities of this preliminary mechanical treatment.[3]

"The patient was severely burnt by an explosion of gas and oil. The face was a mass of cicatricial tissue; the skin of the forehead was thin, pale, parchment-like and as tight and immovable as a drum-head; the cheeks were hard, thickened, and incapable of movement under the fingers; there was a large ectropion of the upper and lower lids of both eyes. The method of Tagliacotius was tried and was unsuccessful. For fourteen months his face (all over, forehead and cheeks) was rubbed with neat's-foot oil, twice daily at first, then after some weeks three times a day; the skin being pressed and pushed and manipulated in all ways, to get up mobility. After the first three months a favorable change was noticed, and after fourteen months the skin on the forehead was as pliable as normal skin, and the cheeks could be pinched up and moved in any direction. . . . Transplantations [pedicellate] were then made from the forehead to make the upper lids and from the face alongside the nose for the lower, with brilliant success."

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[1] Lawson, *Injuries of the Eye*, Am. ed., 1867, p. 372.

[2] Bull, "The Treatment of Scars of the Face Involving the Eyelids," *Am. Oph. Soc.*, 1881, p. 219; *Am. Jour. Med. Sci.*, 1881, n. s. vol. 82, p. 431.

[3] Keyser, "Blepharoplastics," *Wills Eye Hosp. Rep.*, vol. i., No. 1, 1895, p. 23.

As showing the value of preliminary treatment, this is the most instructive case I have met with in the literature of this subject. In its original condition, the cicatricial tissue surrounding the eyelids was totally unfitted for plastic purposes, and in the correction of the ectropion there seemed to be no alternative but to resort to some of the methods of skin-grafting; yet by faithful and long-continued massage the structure of the cicatrices was so profoundly and favorably altered that their use in the formation of flaps to restore the lids became really the method of choice. The possibilities which lie in the systematic and persistent treatment of scar tissue preparatory to the performance of blepharoplastic operations are evidently worthy of a more careful practical consideration than has yet been given to them. Scar tissue presents varying characteristics. It may exist as a mere superficial alteration, with the body of the underlying skin but little altered; or it may be so extensive that the entire skin and subjacent soft structures have been converted into connective tissue with firm adhesions to the bony parts beneath. If its area is large, its vitality may be so precarious that comparatively slight alterations in the general health of the patient may cause its more or less extensive ulceration. The characteristic contraction of a scar may go on for years, and until it has been converted into an inelastic fibrous tissue. The contraction following burns is particularly marked, and is of course greater where the part affected is lax and movable than where it is firm and rigid. The amount of deformity therefore, which will follow a scar upon or near the eyelids cannot be definitely determined until long after the original injury has healed. For the same reasons, the immediate effect of blepharoplastic operation may seem to be excellent, and yet the final result, after many months, may be almost a failure.

In a general way, we may say that all plastic operations for the relief of ectropion are made for two coincident purposes:

1. For the relief of deformity (Cosmetic).
2. To preserve or restore the integrity of the eyeball, or conjunctiva (Visual).

These two purposes always co-exist. Any degree of ectropion is a blemish to the face, and to a greater or less degree impairs the usefulness of the eye for vision. In some cases the visual, in others the cosmetic effect is the greater in importance, but in no case may either be disregarded. It is the inalienable right, if not the duty, of every human being to be as beautiful as the accidents of birth and the struggle for existence will permit, and although much beauty is unfortunately a rare endowment, it is the plain duty of the surgeon to spare or restore where possible, whatever beauty of form or face his patients may possess, and certainly he has no right ever to inflict an unnecessary disfigurement. Yet this fact is often disregarded, and perhaps nowhere more flagrantly than in the multitude of proposed operations upon the eyelids. In establishing, then, the principles upon which plastic operations for the relief of ectropion are to be performed, cosmetic considerations must have a permanent and important place. If the eyelids and the surrounding parts are composed of cicatricial tissue, the formation of a new eyelid from normal skin by the operation of Le Fort (Wolfe), however successful it may be from an anatomical standpoint, really adds in some degree to the patient's disfigurement, or at least, even though the lid is reposited, there remains a disfigurement due to the contrast of the graft with the neighboring parts in color and texture, so that if it is equally possible by another method to restore the lid to its normal position and avoid this contrast at the same time, such a procedure is to be preferred, other things being equal. That is to say, under the circumstances specified, a cicatricial flap constitutes the method of choice. On the other hand, for similar reasons, given a cicatrix involving the lid only, either wholly or in part, the operation to be selected is its liberation or excision, and replacement by normal skin.

The conditions under which cicatricial ectropion exists, and the symptoms which each individual case presents are so various, that rules and methods for the performance of operations for its correction must necessarily be of the most general character. The factors which must be taken into consideration are in general the following:

A. Concerning the scar.

1. *Its Location and Size.*—The amount and portion of the lid involved will modify the method to be chosen. If the ectropion is due to the traction of a bridle of connective tissue, this may be divided. Small scars may be excised. The condition of the parts surrounding the lids must be considered. The direction in which the traction upon the lid is exercised must also be observed. The scar from the operative wound must be made, if possible, to assist in counteracting this traction. This may determine the position of the pedicle of the flap used.

2. *Its Character.*—As has been already indicated above, scar tissue is variable in its qualities, depending upon its cause, extent, location, and age. Some of it may be admirably adapted for transplantation, some may be admittedly unfit, and some which is unfit as it exists, may by proper mechanical treatment long continued, be converted into excellent material for flaps. Adherent scars due to disease of the underlying bone, may sometimes be divided subcutaneously, raised and supported upon hare-lip pins and subsequently treated by massage so as to make them eventually fit for plastic purposes.

B. Concerning the lid.

1. *The Elongation of the Lid Border.*—Where this elongation is slight it may be disregarded, but if it is considerable, the operation should involve its shortening.

2. *The Extent of the Eversion.*—An operation applicable to only slight degrees of eversion (*e. g.* the V Y operation), should not be attempted where the eversion is marked.

3. *The Amount of the Lid Structure Involved.*—It is of much importance to note whether the lid is involved in its entire thickness or whether the tarsal (posterior) layer is still normal.

C. Concerning the patient.

The *age and condition of the patient* are important. Skin-grafting by any method is much more likely to succeed in young than in old persons. Ill health of any sort, particularly disturbances of nutrition, may imperil the success of a plastic operation, so that where the other conditions are favorable, it may be necessary to resort to preliminary constitutional treatment. If the patient is mature, intelligent, willing, and docile, the Italian operation may be performed in appropriate cases, while if young or unruly, this method will be inadmissible.

D. Concerning the method of operation.

We may distinguish two general methods, which may be subdivided as follows:

I. Flaps with a pedicle.
  a. From the surrounding parts.
  b. From the arm. (Italian method.)
II. Flaps without a pedicle (grafts).
  a. Grafts comprising the entire thickness of the skin.

1. Large grafts, fitted to, and completely filling the defect. (Le Fort—Wolfe.)

2. Smaller grafts, forming a mosaic, completely filling the defect. (De Wecker.)

3. Small, or medium-sized grafts, isolated to form separate centres of epidermization. (Reverdin, Lawson, Ollier.)

  b. Grafts involving only the superficial portions of the skin.

1. Small flakes or scales of epidermis (Fiddes), or hairs with their root sheaths. (Schweninger.)

2. Large pieces, comprising the epidermis and outer layers of the cutis (Thiersch), or the epidermis and the tips of the papillæ (Eversbusch). (Practically in removing these large epidermic grafts, it is impossible to cut exactly in one plane,

so that they are of necessity thicker in some parts and thinner in others, rendering any real distinction between these two methods rather fanciful than otherwise.)

Each of these rather numerous methods has its sphere of usefulness. None is universal. For a decade or so, following the introduction of skin-grafting, it seemed as if the use of pedicellate flaps was destined to become obsolete, but the continued experience of operators has served somewhat to rehabilitate this ancient method. Its possibilities have been particularly increased by the introduction of the preliminary massage of scar tissue. It has been found that the method of Le Fort (Wolfe) may be followed by an immediate result that is capital and entirely satisfactory, and yet in the course of time, through degenerative changes in the flap, the accrued benefits may be quite lost. It has been observed that these grafts undergo great shrinkage; for example, one originally 2 *cm* square shrunk to 8 x 2 *mm* in size. They may submit to alterations in structure as well; the surface may exfoliate, granulations may spring up in the underlying parts, and the original cicatricial condition may be regenerated. The use of small grafts is tedious, and is followed by much contraction. The method of Thiersch is more promising. Healing is rapid and there is but little contraction. The new skin formed may have the thickness and quality of true skin. It is probably the best and most universal of all the methods of skin-grafting. It is true that the transplanted pedicellate flap may die; that it leaves a secondary defect, a new scar; that if a failure, it cannot be repeated, and that owing to the nature of the cicatrix, it is sometimes impracticable. It is also true that the secondary defects which skin-grafting leaves, if any at all, are remote and unimportant; that the operation may be repeated indefinitely, and that it is always possible. Yet the pedicellate flap may make a better lid, a more perfect and more comely restitution; the chances of a combined anatomical and cosmetic success may be greater, and the secondary deformity may not really exist as such. The arguments against it are not so coercive as they have seemed to be, and we are bound to concede to it a certain usefulness.

A summary of all the factors involved in the general problem, the relations of which we have been examining, seems to lead to the following propositions[1]:

The use of pedicellate flaps constitutes the method of choice.

1. When the cicatrix is confined to the lids, the surrounding parts being normal.
2. When the cicatrix involves not only the lids, but also the surrounding parts, and has the qualities necessary for successful transplantation.
3. When the cicatrix involves not only the lids, but also the surrounding parts, and although not of good quality for plastic purposes, can be rendered so by prolonged preliminary massage.

The use of skin-grafts (preferably those of Thiersch) constitutes the method of choice.

1. When the cicatrix involves not only the lids but also the surrounding parts, and neither has the necessary qualities for plastic purposes, nor can be made to assume them by treatment.
2. For the relief of secondary defects (either fresh or granulating), left after the performance of a plastic operation, or after the removal of malignant neoplasms.

It is a fair conclusion I believe, from what has been shown above, that "the general belief that scar tissue should not be included in skin-flaps" is an error, and that under many circumstances, it is the very material to be selected above all else for attaining the best results. Its employment requires experience, discrimination, and judgment. Its use is often improper, but it does not therefore deserve a sweeping and universal condemnation. Hotz[2] has shown how it may be put to excellent account from a mechanical standpoint, and the future experience of operators who do not consider it *déclassé* on general principles, and who are willing to avail themselves of its valuable properties, will, I think, demonstrate its usefulness, and will give it a legitimate and established place.

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[1] Modified from Valude, "De la restauration des paupières." *Arch. d'Oph.*, vol. ix., 1889, p. 398, *et seq.*

[2] Hotz, *loc. cit.*

TRAUMATIC ENOPHTHALMUS.

By C. ZIMMERMANN, M.D., Milwaukee, Wis.

ENOPHTHALMUS, *i. e.*, the sinking of the eyeball back into the orbit, is quite a rare affection, and its etiology is not yet sufficiently explained. Lately Beer (these ARCHIVES, 1893, xxii., p. 98), G. Cohn (*Klin. Monatsblaetter fuer Augenheilk.*, 1892, p. 337), Schapringer (*ib.*, 1893, p. 309), and G. E. de Schweinitz (*Trans. Am. Ophth. Soc.*, 1895, p. 386) have reported cases of their own and from the literature, all together about twenty-six. The cause of enophthalmus in most of these cases was atrophy of the retrobulbar tissue; in two, from a trophic neurotic disturbance. Beer thinks that "cicatricial contraction of the retrobulbar tissue, paralysis of the orbital muscle from a lesion of the sympathetic nerve, and fracture of the trochlea of the superior oblique are not rational explanations. From analogy we would suppose the atrophy of the orbital tissue to be due to a lesion of a nerve centre or tract, and particularly of the sympathetic or of the trigeminus. In neurotic atrophy of half of the face we have a picture similar to that seen in traumatic enophthalmus." De Schweinitz explains his case, in which there was no infraction of the orbital walls, by the lesion of the sympathetic.

I may add the following seven cases, five from recent literature, of which the titles of two are mentioned by De Schweinitz, and two of my own observation, making with the twenty-six above mentioned a total of thirty-one.

Sachs (*Beiträge zur Augenh.*, von Deutschmann, Heft 14, p. 44) observed a case of enophthalmus, which was caused by depression of the inferior wall of the orbit. The orbit became larger, so that its contents with the eyeball sank deeper under the atmospheric pressure.

D. Marshall demonstrated cases of double enophthalmus in the Ophth. Society of the United Kingdom, July 5, 1895, but no description is given in the transactions (*British Medical Journal*, July 13, 1895).

Denig (*Archiv f. Aug.*, xxviii., p. 276, and *Jahresber. d. Ophth.*, 1894, p. 593) related a case in which he thinks that the fifth nerve itself (not its sympathetic fibres) caused atrophy of one side of the face and enophthalmus. Apparently there was a transverse fracture at both apices of the orbital pyramids, a fracture of the right petrous bone in the region of the tympanic cavity, and an alteration of the left fifth nerve (hemorrhage and pressure).

J. B. Roberts (these ARCHIVES, xxv., No. 3, p. 302) in a case of traumatic enophthalmus found depression of the orbit and the supra-orbital ridge and the orbital plate of the frontal bone fractured and driven into the membranes of the brain. There was ptosis, which did not seem to be due to the wound of the lid having damaged the levator muscle, but to nerve injury.

I have observed the following cases:

Case 1.—This is the same case, described in detail in my article "Laceration of the Optic Nerve and the Central Retinal Vessels; Retinitis Proliferans" (these ARCHIVES, vol. xxvi., p. 51), which presented marked enophthalmus. The enophthalmus was caused by a fall on the right eye, by which the visor of the patient's cap was detached and injured the lids and the eyeball, and caused paralysis of the superior rectus muscle.

Case 2.—Came under my care July 19, 1892. The right eye of a carpenter, while looking up on a new building, in which he worked, was struck by mortar falling down about 90 feet. I examined him soon after that and found a cast of mortar filling the conjunctival sac. The whole cornea was opaque and the conjunctiva discolored. Sloughing of the cornea and symblepharon necessitated enucleation in four weeks. In this case the enophthalmus was caused by the violent contusion of the eyeball and the contents of the orbit.

D. van Duyse and E. Bribosia published a case of enophthalmus with intermittent voluntary exophthalmus (*Archives d'opht.*, 1895;

p. 159), with the résumé, that enophthalmus may be due to post-traumatic tropho-neurotic affections, causing a gradual resorption of the fat cushion of the orbit.

If in the permanent cases of enophthalmus a paralysis of the trophic fibres is surmised, Schapringer is disposed to assume also a paralysis of Mueller's muscles, since the nervous fibres are closely connected at the point where the lesion is supposed to be. The theory attributing the cause of enophthalmus to paralysis of the sympathetic nerve has something enticing, especially if we consider the late experiments of Heese (*Archiv für die gesammte Physiologie*, vol. lii., p. 525) summed up in the following way: The different conditions of vascular tonus and the corresponding varying amount of blood in the orbit must influence the position of the ball. There are two forces governing the position of the ball; one is the state of contraction of the vessels with the consequent varying amount of blood in the orbit, and the other is the condition of the musculus orbitalis.

In order to learn how far the *sympathetic* nerve is involved, I put into the enophthalmic eye of our first patient cocaine, which stimulates the endings of the sympathetic nerve in the oculo-palpebral muscles. A protrusion of the eyeball, only occasionally seen after the instillation of cocaine, could not be detected, but the ptosis subsided completely, the palpebral fissure widened as far as that of the other eye, and the pupil dilated, indicating that the cervical sympathetic nerve was intact. Had it been paralyzed, no reaction would have occurred on instillation of cocaine, as *e. g.*, Pflueger did not see any effect of cocaine on the upper lid or the pupil in four cases of ptosis and myosis due to an affection of the cervical sympathetic nerve (*Cbl. f. Aug.*, 1885, p. 206). Thus we may fairly conclude, that the ptosis in our first case was only a mechanical consequence of enophthalmus. Although this experiment with cocaine does not prove the integrity of that branch of the sympathetic nerve which innervates the smooth muscular fibres of the musculus orbitalis of Mueller in the inferior orbital fissure (to the relaxation of which the recession of the eyeball is attributed), it makes it very probable, as there is no sufficient reason why this more remote branch of the sympathetic nerve should be paralyzed and the others not. Therefore the explanation of traumatic enophthalmus without fracture of the orbital walls, based on the assumption of paralysis of the sympathetic nerve, becomes rather uncertain.

A CASE OF SPONTANEOUS ORBITAL AND INTRAOCULAR HEMORRHAGE OCCURRING IN THE COURSE OF A TYPHOID FEVER.

By Dr. C. E. FINLAY, of Havana, Cuba.

THE rarity of the following case, as well as certain unique features it presented, warrant, in my opinion, its publication.

On October 19th of last year, I was called in by Dr. Montané, of this city, to undertake the treatment of certain ocular complications which had made their appearance in a case of typhoid or typho-malaria which he was attending. The patient was a boy, son of well-to-do parents, ten years of age, who had previously enjoyed very good health, and in whose family there existed no taint; he was in the third week of his fever, his temperature running pretty high (between 39.5° and 40.5° C.), but the intestinal symptoms being little marked. Three days previously he had suddenly complained of a little itching in the left eye; a few minutes later an ecchymotic spot appeared on the bulbar conjunctiva. This soon spread over the whole eyeball, the eyelids began to swell, and at the end of a few hours both were enormously enlarged and œdematous, and through the palpebral fissure protruded the swollen and chemotic conjunctiva of the lower cul-de-sac. This condition of the left eye still persisted, when two days later the right eye suddenly commenced to swell in the same manner as the left had done, the swelling not reaching, however, the same extent. No ocular pain of any kind had been complained of. Coincident with the appearance of these phenomena was that of several subcutaneous ecchymotic spots all over the body and limbs, varying in size from that of a pea to that of a silver half-dollar. A hypodermic injection of caffeine, which had had to be applied the day before, in the left arm, on account of the condition of the heart, had been followed by a subcutaneous hemorrhage, which extended from the shoulder to the elbow. The only other evidence of a hemorrhagic tendency was some bleeding from the nose and gums the day before the accident. The urine was normal. The child was being treated by cold baths and tonics, combined with intestinal antiseptics.

Present Condition.—The boy lay semi-comatose, in a typical typhoid state, with a temperature of 40.5° C. The left upper eyelid was enormously swollen and of a dark purple color; the lower, though also swollen and œdematous, was not as much so as the upper. Through the palpebral fissure protruded an enormously large and infiltrated fold of conjunctiva with numerous hemorrhagic spots, its surface being partially desiccated from exposure to the air. It was impossible to raise the upper lid enough to obtain any sort of view of the eyeball. There was no evidence of fluctuation or of pulsation. There was no spontaneous pain, and no tenderness on pressure. The right eye showed considerable swelling of the upper eyelid, marked chemosis, moderate exophthalmus, complete immobility of the eyeball; the cornea was clear, the pupil large and immovable; with the ophthalmoscope only a white grayish reflex could be obtained from the fundus; the eye was apparently sightless.

My diagnosis wavered between an orbital hemorrhage and a thrombosis of the cavernous sinus (for reasons see below). I proceeded to scarify, superficially but freely, the protruding conjunctiva of the left eye, and ordered iced boric acid compresses to be kept applied over both eyes day and night.

On October 20th—the next day—the general symptoms showed a marked improvement, a marked fall in the temperature having taken place, and the child being almost entirely conscious. The swelling of the left lids had diminished a trifle, but at the site of the scarification the protruding conjunctiva showed three large dark blebs, which on being punctured let out dark liquid blood. The right eye showed more swelling of the lids, the cornea was hazy, and the anterior chamber filled by a plastic exudate. The aspect was that of a purulent choroiditis.

October 21st.—Left eye: Considerable diminution in the swelling of the upper lid. From behind and above the protruding conjunctiva some large dark blood-clots were to be seen presenting. Right eye: The cornea appeared on the verge of sloughing. That afternoon, at my request, Dr. Montané and I held a consultation with Dr. Montalvo. At this meeting I was able, for the first time, to raise the left upper eyelid with a Desmarres elevator. The large clotty masses perceived in the morning were found to proceed from the interior of the eye, making their way through the site of the sloughed cornea. The right cornea had commenced to slough. Dr. Montalvo concurred in my diagnosis of "Orbital and Intraocular Hemorrhage (R) and Metastatic Purulent Choroiditis (L)." No variation was made in the treatment.

October 22d.—Cornea of the right eye had totally sloughed. Instead of suppurating, the vitreous was of normal consistence and bright red in color.

From this time on the general symptoms continued to improve, and the local swelling gradually diminished, due to the absorption of the intra-orbital extravasations and elimination of the protruding blood clots, till on November 4th the orbital contents were normal, with the exception of the eyeballs, which were shrunken and sightless. The right eye, after the disappearance of the chemosis, showed for several days a hemorrhagic extravasation on the surface of the sclerotic. At no time was there any spontaneous pain, and only at the end was a little discomfort complained of during the dressings. After the first few days permanganate of potash and bichloride of mercury solutions were used in washing out the eyes to prevent any secondary infection of the blood-clots. The fever continued till about the middle of November. The boy is now fairly convalescent.

This fortunately rare accident is scarcely mentioned in the text-books of ophthalmology and not at all in those of general medicine or internal pathology, nor even in the two most modern monographs dealing with the relations of general diseases to those of the eye.[1] Of the twenty-six cases of spontaneous orbital hemorrhages which I have been able to collect in literature, not one occurred in typhoid fever. The only mention of the possibility of such a complication which I have come across is in a paper by Carron du

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[1] Berger, *Les Maladies des Yeux dans leurs Rapports avec la Pathologie Générale*, Paris, 1892.

Knies, *Beziehungen des Schorgans und seiner Erkrankungen*, Wiesbaden, 1893.

Villards written in the year 1858,[1] in which in dealing with non-traumatic bloody effusions into the orbit he refers to a report of his father to the King of Sardinia in the year 1827, where several cases are mentioned. Berlin[2] seems however to doubt their authenticity. In none of these twenty-six cases was there any sloughing of the cornea, nor an intraocular hemorrhage of the nature of that which occurred in the left eye, which reminds one of the severe choroidal hemorrhages seen, at times, after glaucoma and cataract operations.

The diagnosis was at first by no means easy and had to be arrived at by a process of exclusion. Of the different lesions capable of bringing about a similar local appearance, an arterio-venous aneurism of the cavernous sinus could be excluded off-hand, in view of the absence of pulsation or thrill, of the rapid development, and of the lack of any history of traumatism or of any local lesion which could explain its appearance. An orbital abscess, cellulitis, or phlebitis could likewise be discarded, on account of the rapid development of the lesion, and the absence of fluctuation, spontaneous pain, or local inflammatory symptoms. A thrombosis of the cavernous sinus was more difficult to exclude, none of the above reasons sufficing. The mental condition of the patient complicated matters, it being no easy task to determine whether the semi-comatose condition in which he lay was to be laid at the door of his typhoid or attributed to the local lesion. The double-sided nature of this, the fact of venous thrombosis from weakening of the heart action being known as one of the complications of typhoid,[3] inclined me towards a thrombosis. On the other hand, the ecchymotic spots on the lids, the absence of any œdema over the mastoid, mentioned by Fuchs[4] as being of diagnostic importance in the differentiation of a thrombosis from an orbital phlegmon, and especially the multiple subcutaneous hemorrhages all over the body showing a generalized hemorrhagic tendency, were in favor of the diagnosis of orbital hemorrhage. The marked diminution of the cerebral symptoms the second day, notwithstanding the persistence of the local lesion, confirmed this last opinion, which was still further upheld by the subsequent course of the affection as well as by the favorable termination of the disease as regards life.

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[1] *Ann. d'Ocul.*, xl., 124.

[2] Graefe-Saemisch, *Handb. d. gesammt. Augenheilk.*, vi., 559.

[3] Strumpell, *Pathologie Interme*, i., 23. French translation, Paris, 1884.

[4] *Lehrb. d. Augenh.*, Leipzig, 1891, S. 640.

A careful analysis of the reported cases fails to reveal any common cause: in six scurvy was the alleged one, but in all these this is not quite clear; in four there was Bright's disease, in two the occurrence was attributed to a sudden suppression of the menses, in one there was purpura, in one hæmophilia, in one anæmia, in one arterio-sclerosis, and in one the lesion was attributed to a reflex irritation from the stomach. In my case it seems to have been some degenerative change in the walls of the blood-vessels,[1] in connection with the general lowering of the system belonging to the typhoid; or else we had to deal with a complicating purpura[2]. The sloughing of the corneæ was evidently due to interference with their nutrition by the mechanical pressure of the blood-clots and effused serum. The intraocular hemorrhage of the left eye probably occurred on the sudden diminution of the intraocular pressure coincident with the corneal sloughing. As already stated it was of the same nature as those disastrous post-operative choroidal hemorrhages which occur, fortunately most rarely, after cataract extractions and somewhat less infrequently after glaucoma operations.

The *treatment* employed only tended to favor the absorption of the effused blood and elimination of the protruding blood-clots, special care being taken to prevent any secondary infection, little or no hope ever having been entertained of saving either eye. The general treatment was directed to toning up the system, lowering the temperature (cold baths), disinfecting the intestinal tract, and preventing a recurrence of the hemorrhages (ergot).[3]

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[1] Homolle, Jaccond's *Dictionnaire de Médecine et Chirurgie*, vol. xxxvi., p. 595.

[2] This is rather rare; thus Liebermeister only found it nine times in 1420 cases (Homolle, *l. c.*, p. 723).

[3] In only ten of the reported cases of spontaneous orbital hemorrhage could I find any mention of the termination—four were total recoveries, one a partial recovery, and five total losses of sight or life.

LIST OF THE CASES OF SPONTANEOUS ORBITAL HEMORRHAGES REPORTED IN LITERATURE.

1. Fischer, *Lehrb. d. gesammt. Entzund.*, Prague, 1846, S. 359. (Quoted by Berlin, *l. c.*)

2. (?) Hyrtl, *Topograph. Anat.*, i., 159, 1853. (Quoted by Berlin, *l. c.*)

3. (?) v. Graefe, *Arch. f. Ophthal.*, i., 1, 424. (Quoted by Berlin, *l. c.*)

4. Carron du Villards, *Ann. d'Ocul.*, xl., 124.

5. Wharton Jones, *Brit Med. Jour.*, May, 1863. (Quoted by Berlin, *l. c.*)

6. Zehender, *Handb. d. Augenh.*, ii., 414, 1876. (Quoted by Berlin, *l. c.*)

7. Magnus, *Deutsche med. Wochenschr.*, 1878, p. 29. (Quoted by Friedenwald and Crawford, *vide infra.*)

8. 9. Ayres, these Archives, x., 1, 42.

10, 11, 12. Sattler, these Archives, xiv., 2, 190.

13. Motais, *Ann. d'Ocul.*, xcv., 4.

14. Thompson, *Jour. Am. Med. Assoc.*, Oct. 30, 1886. (These Archives, xvi., 3, 341.)

15. Panas, *Arch. d'Ophthal.*, viii., 2, 153.

16. (?) Day, *Med. News*, 1888, p. 460. (Quoted by Friedenwald and Crawford, *vide infra.*)

17. Priestley-Smith, *Ophthal. Hosp. Rep.*, xii., 270. (These Archives, xviii., 3, 339.)

18. Jeafferson, *Lancet*, 1889, ii., 111. (Quoted by Friedenwald and Crawford, *vide infra.*)

19. (?) de Wecker, *Traité Complet d'Ophthal.*, par de Wecker et Landolt, iv., 749. Paris, 1889.

20, 21, 22. Spicer, *Trans. Ophthal. Soc. of U. Kingdom*, xii., 33. (These Archives, xxii.)

23. Mitvalsky, *Hirschberg's Centralblatt.*, 1893, 1. (Quoted by Friedenwald and Crawford, *vide infra.*)

24. Raillon, *Lancet*, March 3, 1894. (Quoted by Friedenwald and Crawford, *vide infra.*)

25. Friedenwald and Crawford, these Archives, xxiii., 1, 142.

26. (?) Gunn, Ophthal. Soc. of U. Kingd., May 7, 1896. (*Ann. d'Ocul.*, cxv., 469.)

TRAUMATIC PULSATING EXOPHTHALMUS—LIGATION OF COMMON CAROTID—RECOVERY.

By A. B. KIBBE, M.D., Seattle, Wash.

TRAUMATIC pulsating exophthalmus is not so rare as to make a simple case-history of very great value. For statistical purposes, however, every case treated, and whatever the result, should find its way into medical literature.

The following instance presents an added point of interest through the unusually complete combination of the symptoms of *cavernous sinus thrombosis :*

H. C., aged twenty-four, was injured May 10, 1896, by having his head caught between two heavy logs. It was thought at the time that his injuries were almost necessarily fatal, owing to the colossal hemorrhage from nose and mouth and from the right ear. He was removed to his home as soon as possible, where examination showed no external wound. Both eyes were in a state of marked exophthalmus and unconsciousness was profound.

On the day following the injury, his attending physician, Dr. Beach, observed the following conditions : Œdema of brow and lids and complete paralysis and anæsthesia of right side of face. Pupils dilated and immovable. Immobility of right eye. Pronounced chemosis of conjunctiva in both eyes, more intense in right. Deafness in right ear. Paralysis of velum ; as shown by regurgitation of fluids through nose when attempts were made to swallow.

His general condition slowly improved until September 11th, when he consulted me in company with Dr. Wells of Shelton, who was then attending him. Examination at this time showed paralysis of right facial, anæsthesia of corresponding side of face; complete right ophthalmoplegia interna and externa ; chemosis of conjunctiva protruding between lids, but confined to lower half of globe. Inferior two-thirds of cornea covered by chemosis, which, aided by exposure consequent on the drooping of the lower lid, had apparently caused an erosion of the corneal epithelium and superficial layers of the corneal tissue. V = fingers at two feet. Slight pressure on the globe elicited marked pulsation. The finger-tip introduced beneath upper and inner edge of the orbit disclosed dilated and strongly pulsating vessels. Auscultation over the temporal and frontal regions revealed a loud aneurismal bruit, more distinct in the former locality. The left eye showed an extensive cicatrix, involving quite the lower half of the cornea ; pupil dilated and fixed. $V = \frac{20}{80}$. Motion perfect in all directions. The paralysis of the velum had disappeared. Hearing distance, whispered speech at thirty centimetres. Tuning-fork heard better on mastoid than in front of ear. No exact tests were made of the hearing further than this, owing to the weakness of the patient. Ligation of the common carotid having been proposed and consented to by the patient, he was sent to the Seattle General Hospital the same day ; and eleven days later, assisted by Dr. A. Raymond, I tied the artery just above the omo-hyoid muscle. Pulsation and bruit ceased at once. The chemosis gradually diminished, and the pain ceased almost entirely. The protrusion of the globe gradually grew less, but no improvement in motility was apparent. Sensation seemed to be returning, and he thought his hearing in the affected ear was slightly improved. The watch and whispered speech, however, failed to show any marked change. The condition of the cornea rapidly improved, but vision remained as before. He was discharged from the hospital twelve days after the operation, and returned to his home.

A letter received from his physician, Dr. Wells, November 4th, states that his condition is very much better. There has been no return of the aueurismal bruit, and the exophthalmus is less pronounced. The facial muscles have regained some power, and the eye can be almost completely closed.

It is rare to see so complete a combination of the symptoms of cavernous sinus thrombosis. Scarcely one was lacking. Œdema of brow and lids, exophthalmus, chemosis, complete ophthalmoplegia externa, with facial paralysis and anæsthesia, make the clinical picture complete. Whether ligation of the carotid performed earlier would have prevented the extensive injury to the right cornea consequent on erosion and pressure from the chemosis, is questionable. The hemorrhage into the orbits must have been excessive, as shown by the condition of the left eye, which presented a large corneal cicatrix, but no further evidence of involvement of its respective cavernous sinus. To be sure the latter may have been thrombosed and later have become pervious.

A complete case-history up to the time I saw the patient was not obtainable, as Dr. Beach, who attended him at the time of injury and for several weeks thereafter, was not with him when he consulted me.

While the symptoms of sinus thrombosis were positive, it is not probable that there was an actual thrombus in the vessel. That which produced the symptoms was unquestionably the rupture of the internal carotid artery into the sinus, permitting access of arterial blood to the venous paths and consequent increase of pressure on the nerve trunks.

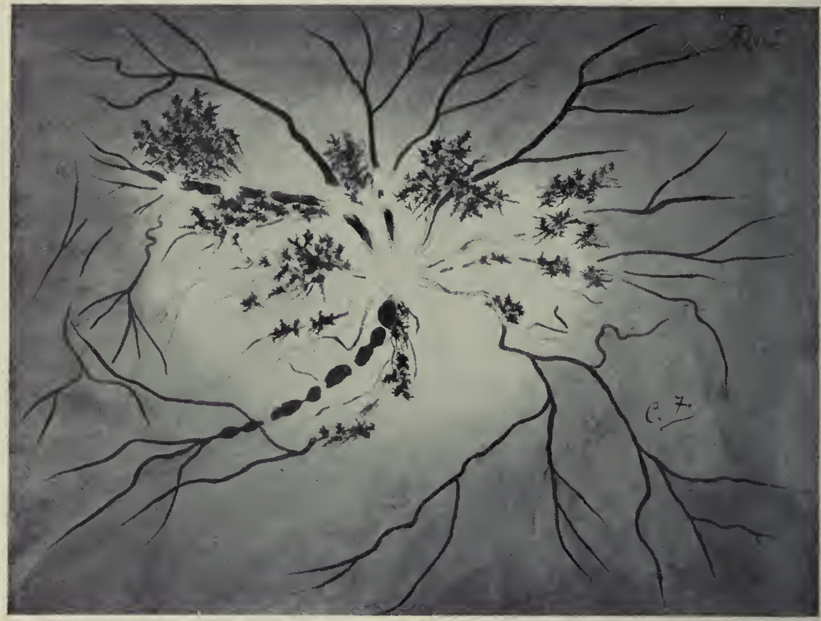
Fig. I
C. 7.

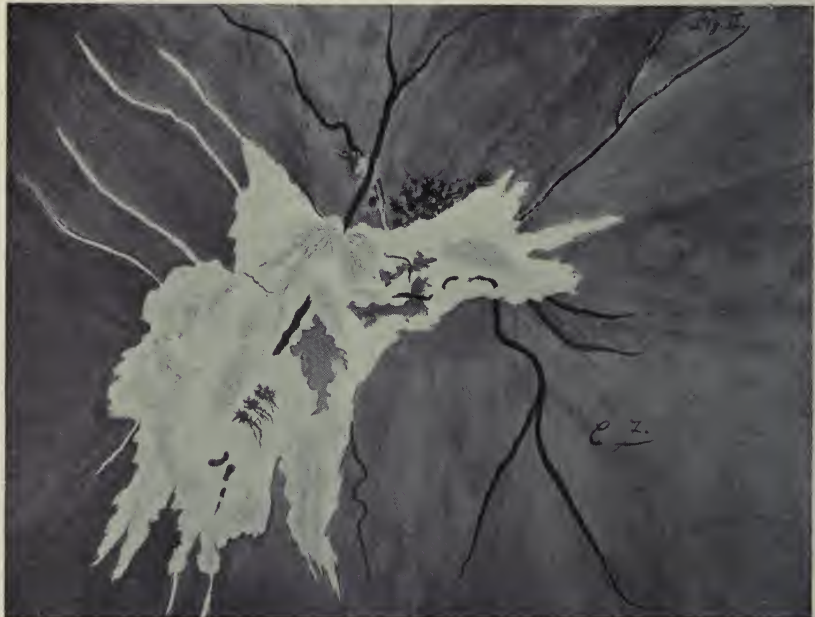
Fig. II
C. Z.

LACERATION OF THE OPTIC NERVE AND THE CENTRAL RETINAL BLOOD-VESSELS; RETINITIS PROLIFERANS.[1]

By C. ZIMMERMANN, M.D., Milwaukee, Wis.

(*With two figures.*)

THE few cases of laceration of the optic nerve and the central retinal vessels so far published have been studied in connection with the experiments of Berlin, Leber, and others on animals. These, however, had led to different results, so that the clinical pictures were not always in harmony. Therefore Wagenmann (*v. Græfe's Archiv*, vol. xxxvi., iv., p. 1) again took up the experiments on rabbits, and showed that in some of the former the retinal vessels had not been divided, as supposed by the authors, and that some of the subsequent ophthalmoscopic changes were due to a division of the *ciliary*, not the retinal vessels. In order to verify, whether the ciliary or the retinal vessels or both were divided, he used a new method, viz.: he made injections from the common carotid artery, a method which alone can yield reliable results.

The various features of the following case will be better understood, if we compare them with the experimental and anatomical investigations of Wagenmann, for which they will furnish a clinical commentary. We must, however, bear in mind, that observations made on animals are not always strictly applicable to the human body on account of anatomical differences. Some animals have no retinal vascular system at all, and in the rabbit the retina contains blood-vessels only so far as the medullated nerve fibres extend.

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[1] Read before the Milwaukee Medical Society, December 8, 1896.

I saw the case for the first time on Dec. 21, 1895, in consultation with two physicians.

History.—On Dec. 18, 1895, the patient, a tall, strong man of thirty-seven years, attempted to board the front platform of an electric car, which was moving fast. He fell, however, and dropped with the right side of his face on the ground with such violence that the strong leather visor of his cap was detached and struck his nose and right eye. He did not lose consciousness and was able to walk up stairs to a physician's office nearby. A horizontal wound, 3 *cm* long, extended over the right upper lid and one vertically upwards along the lateral margin of the orbit 1.5 *cm* long. Another vertical wound was at the medial angle of the palpebral fissure, 1 *cm* long. The nasal bones were fractured. Considerable bleeding. The wounds were sutured and the nose dressed.

Dec. 21st I found the following *condition:* Lids of right eye swollen, no exophthalmus. A vertical wound of the ocular conjunctiva at the lateral portion. The conjunctiva, very red and swollen, projected, in the form of a blister, between the lids, even when they were closed. *Ptosis* of upper lid and lack of mobility of the globe outward, downward, and upward. Some scratches on the cornea. Pupil irregular, wider than the left, not reacting to light directly, but slightly consensually. T. not diminished.

Ophthalmoscopically : Media clear. The optic disc is not clearly defined ; its situation, however, can be inferred from the arrangement of some radiating vessels. The background around it has a milky appearance as in embolism of the central retinal artery. Most blood-vessels are lacking, some are linked. Retinal hemorrhages. V = 0, not even perception of light in any portion of the visual field.

Diagnosis.—Laceration of the optic nerve and the central retinal vessels between entrance of the latter into the optic nerve and the eyeball.

Prognosis.—Absolutely bad in regard to sight.

Dec. 30th (at my office).—Optic disc not defined, shows no red blood-vessels, the contours of which can, however, be made out. In some there is a thread of blood in their axis. The vessels which are visible are mostly veins, which are thickened and severed into dark red sections like sausages. Retinal hemorrhages along the veins. The periphery of the fundus has a normal redness, but the milky haziness around the disc is the same (Fig. 1).

Jan. 22, 1896.—Some blood-vessels at optic disc are transformed into empty cords, except four, which contain a filiform red blood column. Two large veins, running downward and laterally, are interrupted and end temporally into white cords. The hemorrhages are partly absorbed, the milky appearance is subsiding. Formation of connective tissue commences.

Feb. 11th.—Right pupil 4.5 *mm*, left 3 *mm*. Both move on convergence and accommodation. Right reacts to light only consensually, not directly. Left only directly, not consensually. The ocular movements are normal except upwards, from paralysis of the superior rectus muscle. The ptosis persists. The skin of right upper lid below the supraorbital margin presents a deep furrow. Right eyeball is sunk back into the orbit, and the eye looks smaller, gives the impression of an artificial eye. It shows marked *enophthalmus*.

March 11th.—Hemorrhages mostly absorbed, but white patches are now visible which look like new formation of connective tissue.

Sciascopy shows the same accommodation in right as in left eye at a convergence to a point of fixation at 25 *cm* (*cf.* my article "Accommodation in the Amaurotic Eye," these ARCHIVES, vol. xxv., p. 43).

Oct. 3d.—Right pupil dilates after instillation of homatropine, except the lower portion. Tension diminished. Glaring white connective tissue starts from the optic disc toward the nasal portion of retina. It has an alveolar arrangement, leaving red fundus between its meshes. Some blood-vessels pass over it, some are hidden and emerge from its peripheral borders, some are very small and are apparently new-formed. Only a few small spots of black pigment are seen at its upper border. Blood-vessels at the papilla empty, in some a very thin axial red line, one runs upwards, one downwards and two downwards toward the temple. Very fine new-formed blood-vessels in the shape of a fascicle course from the periphery of the optic disc a short way in a temporal direction, and form a fine net-work toward the macula. At the latter there is also new-formed whitish tissue and two hemorrhagic patches. The optic disc is partly covered by connective tissue, but what can be seen of it is white, atrophic. All these details are best seen with + 2.00D. The lower temporal portion of the fundus presents an extensive formation of connective tissue. It is prominent (best seen with + 6.00D), has a greyish appearance and reminds one in its shades of the pictures of mountains on a map. The lower vessels lead toward it and disappear. At its periphery white cords (former blood-vessels) spread toward the periphery of the fundus which has the usual red color.

Nov. 7th.—(Fig. 2.)—The degeneration and formation of connective tissue has further developed. The optic disc is covered by it and by more new-formed blood-vessels. There are only two retinal vessels, one upward with varicose course and one downward, which contain blood, commencing some distance from the disc. Some new-formed blood-vessels are seen on the connective tissue tracts and some remnants of hemorrhages. Next to the upper vessel the degenerated wall of another blood-vessel can be clearly seen. It has dark nodules as appendices, apparently remnants of varicosities. More towards the equator it contains blood.

The clinical history and the ophthalmoscopic picture show, I think, evidently that the diagnosis laceration of the central retinal vessels behind the globe was correct. The question arose, however, whether the central vessels were injured in the orbit *before* or *after* their entrance into the optic nerve, which occurs 15 to 20 *mm* behind the eyeball. In the latter case we would also expect a laceration or an avulsion of the portion of the optic nerve containing the central vessels, which so far only has been observed, when foreign bodies entered the orbit with great force (Pagenstecher, *v. Graefe's Archiv*, xv., l., p. 223, Schiephake, *Inaug. Diss. Giessen*, 1888), or if the optic nerve was purposely cut, as in a case of carcinoma of the optic nerve removed with preservation of the eyeball by Knapp (These ARCHIVES, vol. iv., p. 323). Ophthalmoscopically it is of no importance, as injuries of the optic nerve without damage to the central vessels do not show until two to four weeks afterwards, when atrophy sets in (Leber in Graefe-Saemisch, v., p. 919). Nor would it make any difference to sight, which is lost in either case, and the final result in atrophy, as division of the optic nerve behind the entrance of the central artery causes atrophy of the nervous elements as well as embolism of the central artery (which has the same effect as cutting the artery), with preservation of the continuity of the optic nerve.

The wounds of the skin and the paralysis of the rectus superior indicate that the visor struck the upper lid and gouged the eye-ball from above by which the optic nerve very likely was ruptured. In favor of laceration of the nerve is the reflex insensibility of the pupil, showing that the pupillary fibres of the optic nerve were paralysed, which are more resistant than the visual fibres, and may remain intact in blindness from peripheral affections of the optic nerve and retina, as *e. g.* from mere interruption of the retinal circulation. The laceration of the *central artery and vein* which run together only within the optic nerve, also speak for a lesion of that portion of the nerve. There was no exophthalmus after the accident from any considerable orbital hemorrhage, which would have happened, if the blood-vessels were injured further back, because then most likely more blood-vessels than the central vessels alone would have been ruptured. We had, to a certain degree, a combination of the ophthalmoscopic picture of embolism of the central artery and thrombosis of the central vein, only modified by one another.

When the injury occurred, the blood supply of the artery was suddenly cut off, and the blood flowed out from the opened extraocular retinal vessels (arteries and veins), which therefore were empty on the disc and a little way in the retina, where they ended, gradually tapering away. Arteries and veins could hardly be discriminated, but they seemed to be mostly veins. The circulation had ceased entirely.

Wagenmann examined, with the ophthalmoscope, his rabbits a few minutes after division of the optic nerve and the central retinal vessels, and saw the disc become pale and white, the vessels narrowing by the blood current being cut off, the papillary portion emptying its blood outside, and the following interruption of the blood current in several portions. When he divided the central vessels by the galvano- or thermo-cautery (p. 79), the vessels on the disc contained decidedly more blood, and the current did not spread as readily into several portions, because the eschar obviated an effusion of blood into the orbit.

Milky Opacity of the Fundus.—Similar to *embolism* of the central artery was, in our case, a uniformly white, milky haziness of the retina, the indistinctness of the optic disc, and the partial and irregular appearance of blood-vessels. Leber attributes this extensive white cloudiness of the retina in embolism to finely granular opacity in the nervous and elementary parts, and the presence of granular fat cells in the retina. As the opacity generally subsides in a relatively short time, Wagenmann thinks that it cannot be due to essential and anatomical changes in the retina. If it were caused by degeneration of the nerve fibres it could not very well disappear, as it does, before the degeneration is established. Wagenmann, therefore, surmises, that it is produced by transient œdema of the nerve fibres in the retina from the disturbance of circulation, and perhaps is dependent on the integrity of the veins which is preserved in embolism. So far, he says, we are not able to determine beyond doubt whether laceration of the central artery and vein in man occasions the same opacity as embolism (p. 119). Our case answers this question in the affirmative as well as Knapp's case, which, however, was complicated by previous papillitis.

Wagenmann (p. 70) considers the opacity obtained in his experiments after division of the optic nerve and *ciliary* vessels due to the cutting of the latter, since it never occurred in simple division of the optic nerve and the central retinal vessels, and, therefore, different from the cloudiness in embolism of the central retinal artery. This I would explain by the anatomical variety and the different part which the retinal vessels play in the nutrition of the retina of man and rabbit, where they reach only as far as the medullary fibres extend.

Condition of the Retinal Vessels.—Under normal conditions the intraocular pressure must be equal to the intravascular pressure at the end of the retinal vein. "Were it greater, it would compress the end of the vein and stow the blood at the periphery. Were it less, then the vein would swell as much as the elasticity of its walls admits" (Knapp, *l. c.*, p. 347). In our case, the intravascular pressure in the central retinal vessels was abolished, since the central artery was torn, and thus the *vis a tergo* wanting. Therefore, the end of the central vein was completely compressed by the intra-ocular pressure, and the further outflow of blood from the retinal vein was stopped. The blood which, by the last systole before the injury occurred, had been propelled into the retinal arteries and then through the contractility of the arterial walls into the capillaries and veins, stagnated now in the veins and distended them in some places. The blood column (in the veins) grew irregular and was interrupted, since there was no continuous flow any more, and the color turned dark from want of oxydation through arterial supply. Blood-vessels shut off from circulation degenerate. Their walls became permeable, so that, when, after a few days, a collateral blood-supply developed from the only communication of the retinal arteries, the circulus arteriosus Zinni (of the posterior ciliary vessels) encircling the entrance of the optic nerve into the eyeball, hemorrhages occurred *per diapedesin.*

Thus we had a similar ophthalmoscopic picture to *thrombosis of the central retinal vein* in addition to that of *embolism of the central artery*, and, therefore (from the very scanty arterial blood-supply), not so extensive. It shows that the anastomoses by which the venous blood could leave the retina (after some collateral arterial supply had been established) were inadequate.

And this is another proof of the laceration of the vein in the optic nerve. If the central vein had been injured in its course *extra opticum*, the numerous collateral veins would have furnished a sufficient outlet of the blood contained in the central vein after the re-establishment of the collateral retinal circulation, and then we would not have had the ophthalmoscopic picture of thrombosis. Mitvalsky (*Archives d'ophth.*, 1896, p. 22) considers this point of the greatest importance in regard to the loss of vision in obturating thrombosis of the central vein, which only occurs, when the *vein in the optic* nerve is thrombosed, not in its course outside the nerve. According to Knapp (*l. c.*, p. 348), "the way by which the venous blood could leave the retina (after the main outlet of the venous blood was closed, in his case, by the division of the optic nerve) was the venous and capillary anastomoses between the optic papilla and the adjacent retina on the one hand, and the free edge of the choroid on the other, and thence it went through the vasa vorticosa at the equator of the globe out of the eye. This seems a long and circuitous road, offering great resistance to the current. The course of the disease also showed that these anastomoses were inadequate. The veins dilated more and more, became varicose, finally burst in many places and occasioned profuse retinal hemorrhage." Thus *hemorrhagic infarctus* in the retina occurred also in our case, due to the combined action of venous congestion and the abnormal permeability of the walls of the capillaries and veins, brought about by arterial ischæmia. (Cohnheim, *Vorles. ueb. allg. Path.*, 1, p. 88.)

Wagenmann likewise observed (p. 72) that the residual blood in the veins changes around, so that it appears in fusiform accumulations at different times in different portions of the vessels, that the same portion appears filled at times, at others empty. He thinks this partly to be due to the collateral afflux of blood. Different from Knapp's and our case were in Wagemann's experiments the very few and small retinal hemorrhages.

Re-establishment of Circulation.—In most of his animals an imperfect circulation was established through the capillary anastomoses at the periphery of the disc; even the artery on the disc was refilled. Later on he found several fine, new-formed blood-vessels at the disc coming from outside to which he is inclined to attribute the restitution of circulation. Vertical and frontal serial sections of the entrance of the optic nerve indicated that the *restitution of circulation is chiefly owing to new-formed vessels* which enter the disc partly from the choroidal opening, partly from the optic sheath and the episcleral tissue, *i. e.* from the ciliary vessels, and communicate with the (former) retinal vessels. The veins are larger and more numerous than the arteries, but, in comparison to the previous retinal circulation, they are permanently narrowed, less numerous, and do not spread as far into the retina. In some of his experiments the circulation was not re-established. The vessels were empty or they contained amorphous albumen, leucocytes, and now and then degenerated red blood corpuscles. Later on he found them obliterated, so that they could not be injected (pp. 84 and 85).

The collateral blood-supply in our case was very scanty, since only few retinal veins showed varicose portions and a few vessels contained a very small amount of blood. Most of them were transformed into empty cords. At the optic disc itself they were not refilled, some only exhibited an axial red line. New-formed blood-vessels could also be observed on the disc and in the retina.

Degeneration of the Retina and Retinitis Proliferans.—The further course of the morbid changes was degeneration of the retina with development of connective tissue covering the disc and a great portion of the retina. The blood-vessels were partly hidden by it, partly branched over it. The extensive tracts of white and gray fibrous tissue, which on some places projected + 6.00 D., reminded one very much of the affection described by Manz as *retinitis proliferans* (*von Graefe's Arch.*, xxii., iii., p. 229 and xxvi., ii., p. 55). Manz examined the case anatomically and found a chronic retinitis with new formation of tissue on the inner surface of the retina, and therefore called the disease retinitis proliferans, since he regarded the inflammation of the retina as the primary change. Banholzer (These ARCHIVES, xxii., p. 212, 1893) examined another case microscopically which was similar in as much as in both the new-formed tissue in the retina consisted of proliferated Mueller's fibres, connective tissue, and vessels. According to Manz, intraocular hemorrhages stand doubtless in intimate causal relation with the proliferation, as observed in most of the cases published. S. Schultze (These ARCHIVES, xxii., p. 224) considers "the name retinitis proliferans unsuitable for this affection, since an inflammation of the retina has never been observed as the primary disease, while retinal and vitreous hemorrhages were always found." He thinks that "the new masses are not inflammatory and exudative, but rather deposits of unabsorbed blood fibrine. The deposits are in intimate connection with the retina, cause atrophy of the nervous elements of the retina, hypertrophy of the connective-tissue elements, and finally become themselves transformed into fibrous cicatricial tissue. In Schultze's paper will be found a review of the latest literature on this subject: Manz, Leber, Alexander, Schleich, Proebsting, Martinet, to which we may add the observations of Knapp (*l. c.*), Chodin (*Jahresber. d. Ophth.*, xxv., p. 370), and the experiments of Colucci, 1894 (*Jahresber.*, xxv., p. 238).

Another very instructive observation of H. Knapp (*von Graefe's Arch.*, xiv., i., p. 256, 1868), must be mentioned, in which also the mathematical formula is given, according to which elevations of the fundus may be calculated in linear measure from dioptometry with the direct method of ophthalmoscopic examination, viz., a refraction of $\frac{1}{20}$ corresponds to 0.62 *mm*, *i. e.*, 1 D to $\frac{1}{3}$ *mm*. A bullet shot of the orbit through the temple had caused a hemorrhage in the sheath of the optic nerve. The blood made its way in the loose tissue between internal and external optic sheaths into the eyeball and settled between retina and choroid towards the macula, where it could be seen with the ophthalmoscope. After five months the blood was transformed into a bluish-white mass, covering the retinal vessels, which emerged from its periphery. It projected 0.62 *mm* and contained new-formed blood-vessels. Knapp considers this "vascularised pseudomembrane" as an inflammatory product to which the blood gave rise, with and without coagulation of the fibrine.

In our case extensive tracts of connective tissue developed on those places of the retina where hemorrhages had been formerly observed, but the proliferation was so extensive and projecting, that they could not be considered merely as a transformation of blood. In accordance with Schultze, I am inclined to think that they partly consisted of the unabsorbed fibrous remains of the hemorrhages and partly of fibrous degeneration of the underlying retina with hypertrophy of the connective tissue elements of the retina.

In the rabbit (p. 82) the degenerative changes appear somewhat different. The cut surface of the optic nerve is covered with new-formed connective-tissue, which, after a month, fills also the excavated papilla. The nervous fibres of the retina are varicose, the nervous substance is dissolved in drops, and there is a moderate immigration of lymph corpuscles. The remaining retina is without alteration. In later stages the medullary fibres ("Markfluegel") are completely replaced by a thin layer of multicellular connective-tissue. A degeneration of the retina and proliferation of new reticular fibrous tissue was only observed in those experiments, in which a *ciliary* vessel was cut.

This is (as mentioned on page 56), like the glazed opacity of the retina after division of the retinal and not the ciliary vessels (in rabbits), another proof that the ciliary vessels in the rabbit supply the greatest part of the retina, save the medullated fibres, which in man is accomplished by the retinal vessels alone. The supply of the human retina by the retinal vascular system is much more favorable than in the rabbit.

Later on detachment of the retina (as observed by Manz) and phthisis of the eyeball may be expected in our case, since at times it showed hypotony. Differing from the others we had hardly any pigmentation of the retina in our case, except a few spots at the white fibrous tissue and some at the grayish new-formed tissue. As, according to Wagenmann, pigmentation is always due to changes in the pigment layer which derives its nutrition from the choroid, and therefore is due to affections of the ciliary blood-vessels, a complication which all the cases so far published presented, it proves that the affection in our case was chiefly confined to the central retinal vessels. This is also in favor of injury of the retinal vessels within the optic nerve, where they are more isolated than before their entrance into the nerve, where it would have been more likely that more branches of the ophthalmic artery would have been ruptured from which the ciliary vessels arise.

EXPLANATION OF THE ACCOMPANYING PLATE.

Fig. 1 represents the erect image of the fundus on December 30, 1895. Indistinctness of the disc, milky opacity of the posterior portion of the retina, tapering of the blood-vessels towards the disc into thin axial columns of blood. Interruption of the blood column and fusiform accumulations of blood in the veins, and retinal hemorrhages mostly along the veins.

Fig. 2, erect image of the fundus on November 7, 1896. The optic disc and its vicinity towards the nasal portion are covered with white connective tissue (prominent 2.00 D $= \frac{2}{3}$ *mm*). A few blood-vessels partially pass over it, partially are hidden by it. New formation of blood-vessels here, at the disc, towards the macula, and at the large gray mass of connective tissue which extends downwards and towards the temple (projecting 6.00 D = 2 *mm*). The retinal vessels are mostly transformed into white fibrous cords. A few hemorrhages.

A CASE OF BILATERAL NON-SUPPURATIVE DACRYOADENITIS (MUMPS OF THE LACHRYMAL GLANDS, HIRSCHBERG).

By ROBERT L. RANDOLPH, M.D., of Baltimore, Md.

DACRYOADENITIS is such a rare affection that I thought the following case worthy of record. The rarity of the disease may be realized when Arlt, one of the greatest of clinicians, declared in his text-book that he had never seen the disease. Prof. Rudolph Schirmer, in his well-known article on the diseases of the lachrymal organs in Graefe and Saemisch, reports only three cases, and Hirschberg,[1] in 1879, reported one case of non-suppurative inflammation of the gland among 22,500 eye cases. Chronic enlargement of the lachrymal gland resulting from a long-existing keratitis or from a dacryocystitis has been observed not infrequently, and I have seen one such case.

Acute purulent inflammation of the lachrymal gland is rare, but still more rare is the sub-acute non-suppurative variety of the disease, and under this head belongs the case which came to the Dispensary of the Johns Hopkins Hospital on September 15, 1896.

The patient was a large negress, thirty-nine years old, a widow with three children. Early in July she had been troubled with pains down both sides of her face and over the eyebrows, and later on in the month a swelling began to appear at the outer canthus of each eye. This swelling kept on getting bigger till about the middle of August, when it came to a standstill. The pain at this time was intense, yet it was never located in the gland but down the sides of the face and across the forehead.

There seemed to be no periodicity in the pains. No history of syphilis was given, but she had been subject to attacks of rheumatism for years, and beyond this her history was negative in so far as throwing any light upon her trouble was concerned.

One observed a hard, rather nodular, and perfectly immovable tumor, decidedly painful to pressure. This condition was present on both sides, and from its location and shape there was no doubt about its being the lachrymal gland. The tumor extended from the median end of the orbital rim to a point apparently beyond the external end of this rim, the dimensions being as follows : On the right side its lateral diameter was 2.4 *cm*, and the vertical diameter was 1.4 *cm ;* on the left side the tumor was 2.5 *cm* laterally, and 1.5 *cm* vertically. The mass was sharply circumscribed and the skin covering it was stretched very tense. The pressure exerted by the tumor upon the left eye was sufficient to turn the eye inward and slightly downward. The conjunctivæ were red but not markedly so, nor was there any noticeable increase in the secretion of tears. The outer half of both upper lids nearly touched the lower lid, owing to the swelling, and only the inner half of the eye could be seen. This was especially noticeable in the left eye. It was impossible to evert the lids.

I may add that the patient in other respects was quite well. She was put on small doses of bichloride of mercury and ten grains of iodide of potassium three times daily, and she was directed to make hot applications (hot water) to the tumors every two hours. This treatment was kept up for three weeks and on the 9th of October the tumors were half their original size and now, December 10th (nearly six months since the disease began), there is a scarcely perceptible enlargement of the left gland. She opens her eyes readily, and for the past few weeks has been entirely free of pain.

Cases of dacryoadenitis where suppuration of the gland has occurred are undoubtedly to be attributed to infection, and such cases have most often been monolateral. Carré[2] mentions a case where the disease followed erysipelas. Pooley[3] reported a case of dacryoadenitis of one eye due to diphtheritic conjunctivitis in the other eye, and Adler[4] reported a case following measles, while Rider,[5] Galezowski,[6] and Fuchs[7] saw several cases of the disease associated with mumps. Syphilis as a cause has been mentioned by Streatfield,[8] Adler, and Albini.[9] Gallasch[10] reported a case of dacryoadenitis in a child 4½ years old where there was general glandular enlargement throughout the body, and a somewhat similar case is mentioned by Scheffels.[11] Cases like the one which I have just described in this paper are not apt to be due to acute constitutional affections, and hence their origin is somewhat obscure. Similar cases are reported by v. Reuss,[12] Hutchinson,[13] Gaýat,[14] and others.

[1] ARCH. OF OPH., vol. vii., 369, 1879.

[2] *Gaz. d'Ophth.*, 1882, Nr. 5.

[3] *Trans. Amer. Opth. Soc.*, 1885.

[4] *Dritter Bericht des Krankenhauses Wieden.*

[5] *Trans. Med. Soc. State of N. Y.*, Albany, 1872.

[6] *Recueil d'Opht.*, 1886, p. 415.

[7] *Beiträge zur Augenheil.*, H. iii., 1891.

[8] *Brit. Med. Jour.*, ii.

[9] *Annal. di Ottalm.*, 1887, xvi.

[10] *Jahresber. f. Kinderheil.*, 1874, vi., i.

[11] *Centralbl. f. prak. Augenh.*, 1890, S. 136–137.

[12] *Wiener Med. Presse*, 1885., Nr. 52.

[13] *Oph. Hosp. Rep.*, 1871, viii.

[14] *Annal. d'Oculist.*, 1874, lxxi.

PHTHISIS BULBI, FOLLOWING DIPHTHERITIC INFECTION.

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(*With Figs. 1–3, Plate X.*)

WE designate as ocular marasmus, atrophy of the globe, or phthisis bulbi, a condition of general post-inflammatory degeneration of the eye associated with more or less marked decrease in size. Aside from those obscure and often transitory cases of softening, which, more for want of a better name than by reason of accurate pathological description, have been placed in this category under the name of "essential phthisis," this condition is most frequently caused by extensive perforation of the cornea, with subsequent infection and purulent inflammation of the entire globe. The literature on this subject shows that the original affection may be of a widely varying nature, the most usual forms being gonorrhœal conjunctivitis, hypopyon keratitis, extensive burns, and infected wounds. Diphtheritic conjunctivitis, which causes such marked changes in the superficial membranes of the eye, seems to lead but rarely to intraocular degeneration, judging by the very small number of cases reported.

Through the kindness of Dr. E. Gruening I have been enabled to examine an eye which was entirely destroyed in consequence of infection by diphtheritic virus, and had to be enucleated about five weeks after the first symptoms were observed, on account of persistent tenderness and irritation.

In view of the unusual ætiology of this case, as demon-

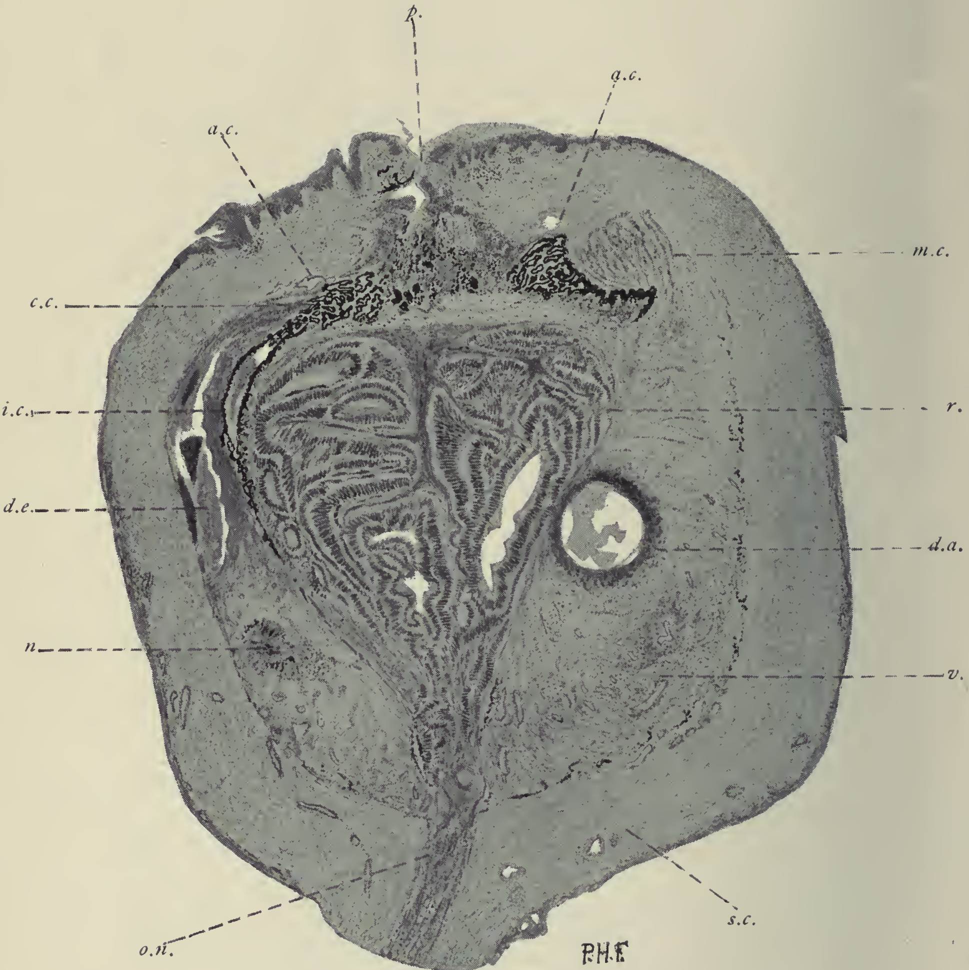

FIG. 1.

strated by the presence of Loeffler's bacillus in the microscopical sections, a detailed account of the pathological changes observed may prove of some interest.

Lily Schwartz, aged fifteen months, was admitted to the eye wards of Mt. Sinai Hospital on December 17, 1895. The following very meagre details of the history were obtained :

About one month ago the child contracted diphtheria. False membranes formed on the conjunctiva of the left eye, and later on the cornea. The child was treated at the Willard Parker Hospital.

Present Condition.—The false membrane has destroyed the whole of the cornea. The iris is shrivelled up. The eyeball is very small and much contracted ; the surface flattened. The eye is painful, but there is no process of inflammation.

December 19*th.*—The atrophic globe was enucleated, in ether narcosis, by Dr. Gruening.

To supplement this very unsatisfactory clinical report, I addressed an inquiry to the Willard Parker Hospital, but was unable to elicit any further information.

The globe was placed in Müller's fluid, where it remained for nearly ten months, when I obtained it for microscopical study. It was then placed in alcohol of increasing concentration, and imbedded in celloidin. Sections were cut and stained with hæmatoxylin and eosin, and by Loeffler's and Gram's method.

Macroscopic Examination.—The globe is hardly larger than a hazel-nut, of an extremely tough consistency, and irregularly cuboidal in shape. The anterior segment is quite flat. Antero-posterior diameter, 11.6 *mm ;* transverse, 9.7 *mm ;* vertical, 10 *mm.*

On bisecting the globe the interior is found to be quite solid. There is no trace of an anterior chamber or of a vitreous cavity, the space normally occupied by the latter being filled with dense fibrous tissue and by the folded retina (Fig. 1). The retina (*r.*) has become completely detached except at the nerve-entrance (*o. n*), and at points corresponding to the ora serrata. It has become reduplicated and compressed by the shrinking globe, and now appears as an almost solid funnel-shaped mass occupying the middle of the globe. The base is directed forward, and is separated from the iris and from the structures about the perforation by a transverse bar or diaphragm of fibrous tissue; the apex is continuous with the optic nerve. The sclera appears unusually thick in comparison to the size of the globe. It shows no reduplication or other noticeable irregularity of structure. There is, however, a marked deviation from the normal form, depending on the cuboidal shape of the globe. This is expressed in the cross-section by an abrupt flattening of the anterior segment, so that the approximately square appearance results, which has been described as phthisis quadrata. The angular transition corresponds to the insertion of the recti muscles near the equator. The surface of the cornea is irregular and opaque, and shows a small fistulous track leading into the interior.

Microscopic Examination.—Before describing the minute changes observed in the different tissues it is well to consider the topographical relations of the structures. The pathological process expresses itself most evidently in abnormal position and distribution of practically all the internal tunics of the eye, while the sclera has remained relatively undisturbed. The anterior segment of the globe shows a condition resulting from an extensive perforation of the cornea with a total prolapse, and degeneration of the adherent iris (Fig. 1, *r.*). The gap in the superficial tissues is partly filled by a fibrinous exudation near the level of the anterior epithelium, and at a lower level by pus and granulation tissue. The lowest or innermost part of the wound plug consists of the infiltrated iris. To either side of this plug a small irregularly triangular space is seen bounded in front by corneal tissue, behind by the iris, and externally by remnants of the ciliary body. This formation indicates the angle of the anterior chamber (Fig. 1, *a. c.*).

The ciliary body appears very much compressed. On the temporal side it ends abruptly in a matrix of connective tissue. On the nasal side the conditions are more complicated. The ciliary processes (*c. c.*) are atrophic and wedged into the neighborhood of the anterior perforation, incarcerated, as it were, by the connective-tissue diaphragm, or bar spoken of above. There seems, however, to have been traction toward the posterior portion of the globe, as the pigment epithelium layer of the ciliary body can be traced back in a curved line bounding the funnel-shaped retinal detachment. Just behind the ciliary muscle this structure encloses a cavity containing a sero-fibrinous exudation. The cavity is nearly 2 millimetres long, about .6 wide at the middle, tapering to both ends. Its form may be called a meniscus, which presents its concavity toward the interior of the globe. The boundary wall appears as a thick, black line (Fig. 1, *l. c.*). Just external to the cystic formation, and somewhat nearer the posterior pole, a *somewhat larger* and *irregular* cavity is found, bounded externally by sclera and internally by connective tissue. The wall of this cavity is not pigmented. There is a hemorrhagic extravasation of large size in the interior. This subscleral hæmatoma measures 2.75 by 0.75 millimetres (*d. e.*). It is separated from the cyst of the ciliary process by a thick band of connective tissue running back from the ciliary muscle into the region formerly occupied by the vitreous. There is no trace of the lens, although at one or two points to be referred to below, tissue is found which may be composed of degenerated lens fibres, or may represent the formation of a structureless glass membrane from proliferation of the cells of the lens-capsule. The interior of the globe is occupied by the detached retina (*r.*), the folds of which have become filled with fluid and are ballooned out in such a way as to simulate a proliferating cyst. The connective-tissue framework of this cystic structure takes the form of branching septa, joining to form a large trunk, which can be traced into the fibrous cyst wall. The base of the funnel-shaped detachment forms a transverse diaphragm (Fig. 1, *d.*), separating the retina from the iris, ciliary processes, and the structure forming the wound-plug. This diaphragm is composed of dense fibrous tissue, enclosing a few elastic fibres and many hyaline fibrils, which bear strong resemblance to the elements of the lens. The detached retina is bounded by a dense mass of newly-formed connective tissue, varying greatly in histological structure at different points. This mass fills out the interior of the globe, and extends to the sclera, although as we approach the latter membrane residual elements of the choroid, especially of the lamina fusca, are found.

In the neighborhood of the equator a small abscess cavity appears encapsulated in the connective tissue just referred to, and surrounded by a pyogenic membrane consisting almost wholly of deeply stained round cells (Fig. 1, *d. a.*). This cavity has an oval form, the long axis placed antero-posteriorly, and measures 1.25 by 1.6 millimetres. The entire globe is infiltrated with round cells, and in many parts of the interior large collections of newly-formed vessels (Fig. 1, *v.*) are found.

The minute pathology of these tissues may now be considered. As the whole globe may be likened to a ruptured vesicle containing inflammatory products, we shall examine, first, the boundary wall (the sclera), then the tissues at the site of perforation, and, lastly, the intraocular exudation, with its different modifications in various parts of the interior, and the degenerated tissues which are found enveloped by this mass.

The sclera (*sc.*) appears uniformly thickened. It measures at the optic nerve entrance 1.8 *mm*, at the equator 1.6 *mm*, and over the anterior segment and at the sclero-corneal margin 0.8 *mm*. This increase in thickness is not due to an inflammatory process, as it is not expressed by an accumulation of cellular elements or newly-formed connective tissue fibres. The nuclei are but slightly increased in size. The course of the scleral fibres is much changed. Instead of a slightly waving but essentially linear stratification, we find a marked crimping of the fibres, so that an almost angular zigzag course results, which may be likened to a regular series of short deep waves. Even the nuclei are affected by this abrupt bending of the fibres, and appear twisted to one side or the other, according as they occupy the hollow or the crest of the curve. The superficial layers are exceedingly vascular, and occasional collections of round cells are found here, as well as in the deeper structures. The anterior seg-

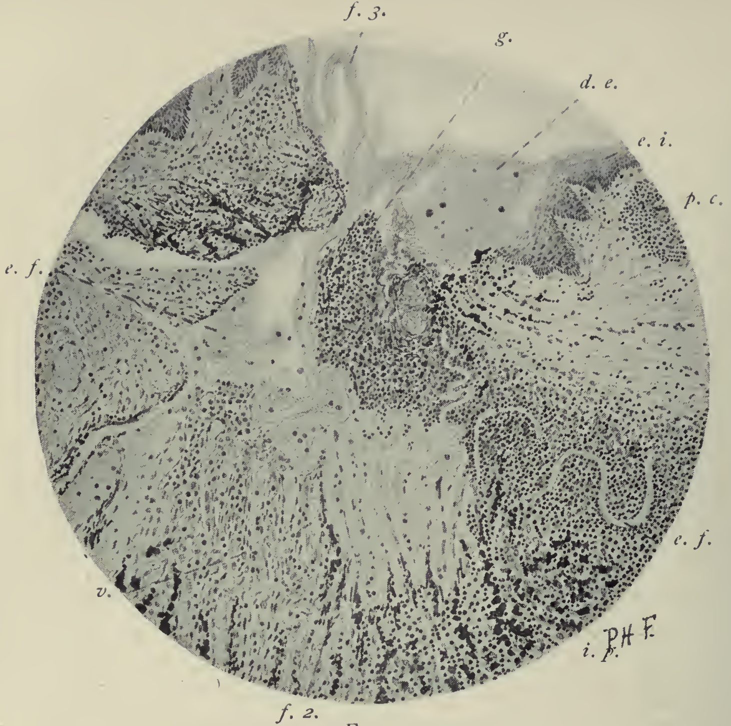

FIG. 2.

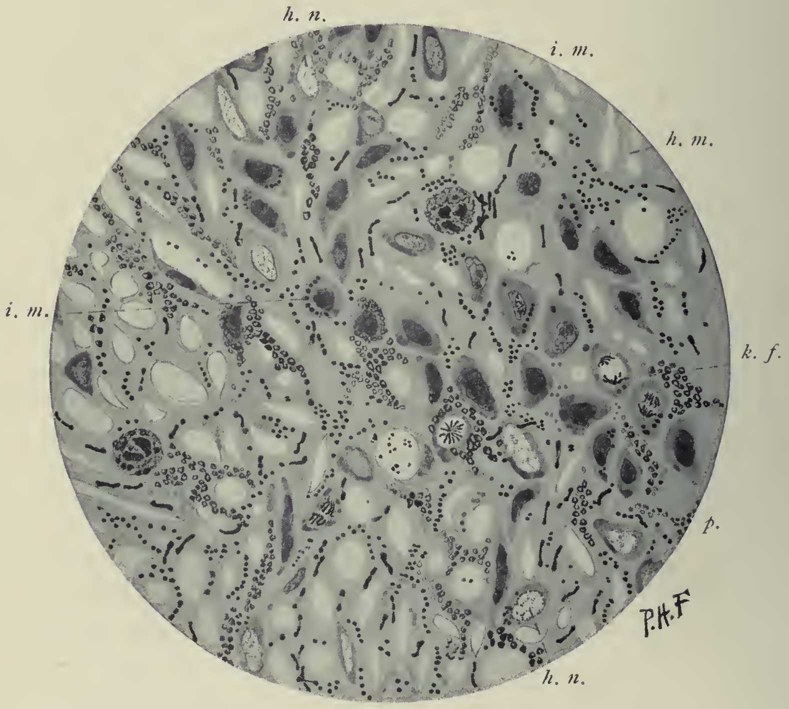

FIG. 3.

ment shows a more regular arrangement of fibres. In the plug of granulation tissue partly filling the perforation (*g.*, Fig. 2), peculiar long structureless bands are found which bear a strong resemblance to the posterior elastic lamina of the cornea. These transparent fibrils present so remarkable an appearance, and are of a nature so foreign to the tissue in which they are found, as to warrant a detailed description. In general they are clear, highly refracting, homogeneous, absolutely anhistous, and about 0.014 *mm* to 0.018 *mm* thick. There is little or no variation in thickness of one fibril. The course is uniformly characteristic, more or less curvilinear, but never wavy. A shape somewhat like that of a capital J, S, or U is found in the deeper parts of the cicatricial plug, which may be caused by natural elasticity plus the pressure on all sides from the granulation tissue (Fig. 2, *e. f.*). Near the centre of the perforation quite a collection of these glassy fibrils is found, arranged very much like hanging coils of rope (f_2), which at one point are straightened out into a long tendril, which may be traced forward to the surface of the globe, where it ends free above the level of the corneal epithelium (f_3). The cicatricial plug is composed principally of round cells with newly-formed connective tissue groundwork and blood-vessels. Near the surface it is covered by a sero-fibrinous exudation containing red blood cells and pigment (*d. e.*).

The choroid, as such, does not appear. We can draw conclusions as to its remaining tissue elements from the presence of numerous flattened, irregularly branched, pigmented connective-tissue cells. These elements appear as dark stellate bodies in the sub-scleral part of that almost homogeneous mass which occupies the interior, together with numerous small blood-vessels and capillaries (Fig. 1, *v.*). The mass itself is composed of connective-tissue fibres, which at one or two points (Fig. 1, *n.*) show a hyaline composition, while at others the more common fibrillary structure is obscured by large aggregations of round cells. The abscess cavity mentioned in the macroscopic examination is found to contain a coagulated sero-fibrinous exudation, with some leucocytes and red blood cells. The lining of this cavity is a pyogenic membrane consisting almost entirely of round cells.

As both the clinical history of the case and the microscopic changes in the specimen suggested the presence of specific pathogenic organisms, a bacteriological examination was made. Unfortunately the globe had been in fixing media for such a long time (nearly ten months) that no positive result of inoculation or of culture experiments could possibly be expected. For this reason the examination was limited to microscopical study of sections stained with methyl blue according to Loeffler's method. In these sections the presence was established of numerous cocci, in groups and small chains, and of slender rods of about the same length as the tubercle bacillus, but nearly twice as thick; the longer rods appeared to be formed of two segments linked together. Irregular forms were quite common, appearing as rods with clubbed or thickened ends, or as slightly curved tapering cones. Clear spaces were seen in many of the bacilli, the stain showing most intensity at the extremities in almost all cases (Fig. 3). The distribution of the micro-organisms was irregular. They were found most frequently among the round cells filling the perforation, in the granulating iris tissue, and in the exudation filling the cysts and the abscess cavity mentioned above. A few bacilli were found in and about the blood-vessels of the episcleral tissue; none in the retina or optic nerve.

Where the bacilli are found in large numbers, marked changes appear in the stroma as well as in the cellular elements. The ground-substance appears homogeneous and glassy (Fig. 3, *h. m.*). The nuclei of the endothelial cells appear fragmented or hydropic (*h. n.*), with irregular karyokinetic figures (*k. f.*). Some of these cells, as well as others, polynuclear leucocytes, contain cocci in chains (*i. m.*), or hæmatogenous pigment (*p.*).

The history of the case shows that only about one month intervened between the development of diphtheria and the enucleation of an atrophic globe. The rapidity of the panophthalmitic process, as well as the extensive perforation, would in themselves arouse suspicion that we had to deal not only with the bacillus of Klebs-Loeffler, but with pyogenic micro-organisms as well. The presence of streptococci and of staphylococci in groups throughout the tissues bordering on the perforation, are absolute proof of this mixed infection.

The characteristic tissue changes due to a specific action of the diphtheria germ, have been described by Ribbert, Oertel, Klebs, Welch, and others. Cloudy swelling and coagulation necrosis of epithelial cells, with formation of a pseudo-membrane composed of fibrin in a state of hyaline metamorphosis, are described in similar terms by these authors. The sclerosed connective tissue in the vitreous space, with the pseudo-membranous deposits, as described above, would show that the specific action of Loeffler's bacillus on the tissues of the eye is in nowise different from that observed in other organs. As to its share in the production of a purulent destruction of the cornea with perforation, there can be, in this case at least, no direct evidence. In all probability, pyogenic micro-organisms have played the principal rôle in this destructive process. Still it must be borne in mind that a tendency to necrosis and perforation is produced by impairment of the corneal nutrition due to the diphtheritic infiltration of the surrounding conjunctiva, and not directly dependent on the pus-cocci.

Description of Illustrations.

Fig. 1.—Horizontal section of phthisical globe.. (Zeiss Obj. a_3, Oc. 1.)

p. Corneal perforation.. *a. c.* Anterior chamber. *c. c.* corpus ciliare. *m. c.* Musculus ciliaris. *r.* Retina. *d. e.* Diphtheritic exudation. *d. a.* Abscess cavity. *n.* Nerve in cross-section surrounded by pigment and hyaline connective-tissue. *v.* Blood-vessels. *sc.* Sclera. *o. n.* Optic nerve.

Fig. 2.—Anterior segment of globe. (Zeiss A, oc. 2.)

e. f. Elastic fibres. f_2, f_3, Long elastic fibre protruding from perforation. *g.* Granulation tissue. *d. e.* Diphtheritic exudation. *e. i.* Denuded and inverted epithelium of cornea. *p. c.* Pus cells. *v.* Proliferating vessels in iris granulations.

Fig. 3.—Klebs-Loeffler bacilli and cocci in diphtheritic tissue. (Zeiss, Homog. Num. $\frac{1}{12}$, oc. 4.)

p. Pigment. *h. m.* Hyaline membrane. *h. n.* Hydropic nuclei. *i. m.* Intra-cellular micro-organisms. *k. f.* Karyokinetic figures.

ON THE PATHOLOGICAL ANATOMY OF THE INTRA-UTERINE DISEASES OF THE EYE, AND PARTICULARLY OF CONGENITAL OPACITY OF THE CORNEA.[1]

By Dr. ALEXANDER TEPLJASCHIN, Kasan.

(*With Plates VII. and VIII. of Vol. XXX., Germ. Ed.*)

Translated, abridged, by Dr. Ward A. Holden.

CONGENITAL opacities of the cornea, particularly when not associated with changes in the curvature and size of the cornea, are rare. Two forms are distinguished, a marginal and a total opacity. In the first sort the opacity forms either a complete ring or only a crescent above and below near the corneal margin, the cornea gradually becoming transparent towards its centre.

In most of the observed cases of the second sort of congenital opacity of the cornea, the cornea was only slightly opaque, and bluish white, the least transparent portion being the centre. Cases of congenital total opacity are extremely rare. (Manz.)

It is supposed that the congenital opacities of the cornea may be either of an inflammatory or of a non-inflammatory nature.

De Wecker distinguishes three groups of the inflammatory opacities:

1. Congenital opacities of inflammatory nature combined with various degrees of buphthalmus.

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[1] From Dr. Mitvalsky's laboratory at Prague.

2. Congenital true leucoma adhærens, as a consequence of embryonic perforation of the cornea, and

3. Congenital opacities caused by interstitial keratitis, which may develop in the fœtus in consequence of hereditary syphilis.

The congenital opacities of non-inflammatory nature are usually found with other congenital anomalies, and are due to developmental disturbances. (Fuchs.)

Steffan saw a central opacity of each cornea in a new-born infant, and after death found that the lens lay immediately against the cornea, there being no other anomalies.

Lawrence explains the non-inflammatory congenital opacities as being a residuum of the normal fœtal opacity of the cornea.

Through the kindness of Dr. Mitvalsky, I was permitted to examine the two eyes of a new-born infant with congenital opacities of both corneæ. The infant had no other anomalies, and it died of lung trouble on the third day. The parents were healthy, and denied a syphilitic taint. The cornea and the eyeballs themselves were of normal size.

Sections of the cornea show it to be nearly normal in structure in the periphery except for some small vascular twigs in the middle layers. In one section a twig is given off from a large vessel at the sclero-corneal margin, and extends nearly to the centre of the cornea (Fig. 1, Plate vii.).

In the anterior and middle layers of the central portion of the cornea are more cellular elements, and important changes are found in the posterior layers of the stroma (Fig. 2, Plate vii.). Here there are numbers of elongated nuclei, and the posterior layers seem to be rather fibrous than lamellar. The membrane of Descemet is thin in its central part, and lying on the endothelium are round cells, scattered and in groups.

In the stroma of the iris there is a moderate infiltration of round cells, and near the pupil there is an elevation of the tissue, containing a small vessel (Fig. 3 *a*, Plate vii.).

There is also a moderate infiltration of round cells both in the muscular and connective-tissue portions of the ciliary body, and also in some parts of the choroid. At some points the lamina supra-choroidea is not loosely meshed, but is a dense connective-tissue structure which can scarcely be differentiated from the sclera. The other portions of the eye are normal.

In the left eye the changes in the cornea are less marked than in the right, and are of a different character. Here the increase in cellular elements in the posterior layers is only in a small field below the centre of the cornea, and there is no vascularity. The greatest infiltration in the iris is at a point below and inward from the pupillary margin. Here the infiltration in its substance and the deposit on its surface produced an elevation in the form of a nodule (Fig. 5, Plates vii., viii.), which pressed upon the posterior surface of the cornea. There are changes in the ciliary body and choroid similar to those in the other eye.

The important changes found in the posterior layers of the central portion of the right cornea were without doubt the cause of the congenital opacity, but the question arises, were the changes the result of fœtal pathological processes or do they represent a congenital lack of development of the cornea. The eyes were from a fully developed infant born at term and there were no other ocular anomalies that could account for delayed development of the cornea. The right eye indeed had a nodule on the iris (Fig 3, Pl. vii., viii.), which might have been considered to be in genetic relation with the persistent pupillary membrane, although this latter is said never to be accompanied with opacity of the cornea except when some portion of it is adherent to the cornea. In our case, however, only a bit of pupillary membrane was present and this was not adherent to the cornea. In favor of the view that the opacity was due to a pathological process, speak the changes found in other parts of this eye as well as those in the cornea and other parts of the second eye.

Pathological changes localized in the deep layers of the cornea, with the other layers normal, are found in diffuse interstitial keratitis, severe iridocyclitis, the presence of exudation in the anterior chamber, large depositions on the posterior surface of the cornea, tumors, etc. The slight changes in the iris and ciliary body of this eye, the absence of exudation in the anterior chamber, and the normal position of the iris, together with the marked structural changes in the posterior layers of the central portion of the cornea, seem to point definitely to a diffuse interstitial keratitis in the right eye.

In our case the vessels of the cornea were very few in number, while in most of the eyes with interstitial keratitis that have been examined microscopically, many vessels were found. This difference is, no doubt, due to the different degree of development of the process. As is known, when interstitial keratitis begins in the centre of the cornea, the periphery may only be involved late, and the vascularization of the cornea may be much delayed. The number of cellular elements with elongated nuclei, and the fibrous character of the cornea, together with the slight degree of vascularity, lead us to the conclusion that we have to do with an initial stage of interstitial keratitis. And the existence of evidences of chronic inflammation in the uveal tract make it seem very probable that this was an interstitial keratitis of heredito-specific origin.

The changes in the other eye are apparently of a different nature. There was an increase in cells in one portion of the left cornea, but no vascularity as in the right; and corresponding to the altered area of the cornea there was a nodule on the surface of the iris, probably of gummous nature, and extending forward to the posterior surface of the cornea. We know from Leber's experiments that disturbance of the corneal endothelium permits the aqueous humor to pass into the cornea and cause an opacity, and Fuchs has described a variety of keratitis which he calls "keratitis originating in the posterior wall of the cornea." This opacity of the cornea would then seem to have been due to the pressure of a gummous nodule of the iris upon the posterior surface of the cornea.

The conclusions to be drawn from the study of these eyes are as follows. The congenital opacities of the cornea in both eyes were of inflammatory nature, the result of pathological changes in the cornea in utero. They were accompanied by inflammatory changes in other portions of the eye.

The opacity in the right cornea was caused by a diffuse interstitial keratitis, while the opacity of the left cornea was due to changes that may be called a "keratitis originating in the posterior wall of the cornea." The other inflammatory changes found in both eyes may be considered as evidences of the action of hereditary syphilis.

In Dr. Mitvalsky's collection are two other eyes with congenital opacity of the cornea, one microphthalmic, the other cyclopic, which I will describe but briefly, as one has already been described in detail by Dr. Mitvalsky and the other will be. The cyclopic eye is not truly cyclopic, at least in its anterior portion, but rather two eyes joined laterally, there being two corneæ, each somewhat smaller than the normal. In transverse sections the appearance of the two corneæ is the same. The outer periphery of both corneæ is of normal thickness, but the centre is thinner, and here the structure is also abnormal (Fig. 6, Pl. vii., viii.). The anterior epithelial layer is thinner, Bowman's membrane can hardly be distinguished, and the anterior and middle layers of the cornea are entirely fibrous. This condition continues through the nasal half of each cornea. The appearance indicates that there has been a delayed development in the inner halves of the corneæ, due no doubt to a diminished nutritive supply on that side.

In the microphthalmic eye, the posterior layers of the cornea are normal, the middle layers contain cells and blood-vessels, while the anterior layers of the stroma are decidedly fibrous and irregular, and are covered with a peculiar layer of epithelium. In both of these cases of arrested development, in which the congenital opacity of the cornea was non-inflammatory, the anterior layers of the cornea were the abnormal ones, while the posterior layers were normal, just the reverse of the condition found in the opacities due to inflammation.

In conclusion I wish to express my thanks to Dr. Mitvalsky for his kindness in giving me this rare pathological material and in aiding me in my investigations.

Explanation of the Figures, Plates VII., VIII.

FIG. 1.—Peripheric portion of the cornea of the right eye. A small vessel passes from the deep layers of the periphery of the cornea forward and inward into the middle layers. The membrane of Descemet has been detached in preparing the specimen.

FIG. 2.—Central portion of the cornea of the right eye. In the posterior layers are the changes indicative of incipient interstitial keratitis.

FIG. 3.—Pupillary portion of the right iris (*A*), moderately infiltrated, and the lens capsule (*B*); at (*a*), a bit of pupillary membrane, and at (*b*) particles of pigment adherent to the lens capsule.

FIG. 4.—The choroid of the right eye. The oval nuclei of the inner layer are increased in number, the supra-choroidea has the character of dense connective tissue, and is not sharply differentiated from the layers of the sclera.

FIG. 5.—A transverse section through the gummous nodule in the left iris.

FIG. 6.—Central part of the cornea of the cyclopic eye.

FIG. 7.—Central part of the cornea of the microphthalmic eye.

A bibliography of twenty titles follows.

THE ETIOLOGY OF RETINAL STRIATIONS, WITH REPORT OF CASES.

By Dr. L. CASPAR of Mülheim-on-the-Rhine.

(*With plates V. and VI. of Vol. XXX., German Edition.*)

Translated by Dr. Ward A. Holden.

FOUR years ago I reported in the Helmholtz *Festschrift* a case of striations in the retina (Jaeger) or, as I termed it, chorio-retinitis striata, the pathogenesis of which could not be determined. The process was one that had run its course, and the history given by the patient threw no light upon its development. There remained therefore nothing but to consider it a chronic inflammatory process in the choroid with secondary involvement of the retina, although the peculiar course of many of the striations seemed to fit neither the anatomy of the choroid nor that of the retina.

That we had to do here with the final stage of a spontaneously cured detachment of the retina did not seem probable to me, notwithstanding the fact that the other eye had a detachment. Nor did Jaeger (Atlas, Pl. xvi.), whose cases alone were known to me then, speak of a previous detachment.

Leber (Graefe-Saemisch, v., p. 639), however, had expressed the opinion that the yellowish- or bluish-white figures sometimes found between retina and choroid in cases in which the detached retina is becoming reapplied, may be identical with Jaeger's retinal striations and may owe their origin to coagula of fibrin deposited in the subretinal fluid. He supports this opinion by a statement of Liebreich's (*Græfe's Archiv*, v., p. 251) in 1859, to the effect that when the retina becomes reapplied after the disappearance of the sub-retinal fluid, the deposits in the latter may remain as bluish-white stripes between retina and choroid. One sees then at times after recovery from detachment, striped figures of this sort scattered over a considerable portion of the fundus, and these are of value in diagnosticating the condition which has previously existed.

The matter, however, has been overlooked to a considerable degree, as Panas in his comprehensive text-book states that the etiology of the affection is still unknown; and the reason for this is that the disease is but seldom seen and opportunities to follow its development with the ophthalmoscope will be most rarely offered. By chance, however, since my previous report, four new cases of chorio-retinitis striata have come under my observation. In part these cases showed the course of their development so plainly that I do not hesitate to contend that all retinal striations or chorio-retinitis striata represent the residua of cured detachments of the retina. In one of my cases the transformation of coagula of fibrin, after detachment of the retina, into typical retinal striations took place almost under my eyes, while in a second case in which there was a partial detachment, the transition from coagula showing through the detached retina, to the white striations in the reattached retina, could be at points followed most clearly.

Case i.—A woman of fifty-one, always myopic, complained of failure of sight in the left eye for three weeks. R. myopia with posterior staphyloma. V. = $\frac{5}{18}$ with — 8 D. L. excentric fixation, V. = $\frac{1}{30}$. The entire lower half of the visual field wanting under diminished illumination. There was a flat detachment of the upper half of the retina from the disc to the periphery, dull blue in color, without undulations, the vessels darker than normal. Above the macula a straight lustrous bluish-white stripe ran obliquely upward and outward beneath the retina. The detached portion of the retina passed over into the undetached without a sharp line of demarcation. Treatment consisted of diaphoretics, hot foot baths, and regulation of the diet.

Two weeks later the picture was considerably changed. The defect in the field was reduced to the lower-outer quadrant. $V = \frac{5}{60}$. The appearance of the fundus is shown in Fig. 1, Pl. v, (erect image). The flat detachment reached only to a point 3 PD from the disc, and included the upper-inner quadrant and $\frac{2}{5}$ of the upper-outer quadrant. The color of the detached retina differed but slightly from the rest. In the portion of the retina previously detached to the nasal side of the disc, ran a number of darkly pigmented, broad but short stripes, to mostly horizontal. Other pigmented stripes, branched and less sharply limited, passed outward and upward from the macula. Between the latter were three long, sharply outlined white stripes, branched and bordered with pigment, running in a radiating direction toward the disc but not reaching it. In the largest of these stripes could be recognized the line seen two weeks before beneath the retina.

Case 2.—A man of thirty-five complained of conjunctivitis in his right eye. When examined, the left eye, which had been injured by a gas explosion six years before, was found to have only excentric fixation. The appearance of the fundus in this eye is shown in Fig. 2, Pl. v. Two broad pale-yellow bands bordered and mottled with black, curve one upward and one downward from the disc, growing broader toward the periphery, each somewhat resembling the tail of a comet. Below, and to the right (temporal) side, the retina is detached but not much elevated. Here, running beneath the retina, are a number of narrow bluish-white stripes having mostly a vertical direction. Similar shorter white stripes are found on the broad yellowish and pigmented bands which extend upward and downward from the disc.

This ophthalmoscopic picture does not indicate the bounding of the normal retina from the detached by an organized chorio-retinitic exudation, which is not uncommon and which, according to Leber, may guard the retina from further detachment. But it is rather to be considered the transformation of a subretinal stripe into a retinal striation which latter can, therefore, only be regarded as having arisen from an organized coagulum. Further, as to the development of typical retinal striations in the region of the exudation. Taking into consideration the distortion of the vessels here, one would conclude that originally the retinal striations developed in a more extensive field, and that later, as the inflammatory exudation became shrunken, the striations were brought closer together and were enclosed in this wall.

A very welcome addition to cases 1 and 2 is

Case 3.—A man of forty-two came under my treatment for left lagophthalmus, keratitis, and iritis. R. media clear. $V = \frac{8}{200}$. The fundus as shown in Fig. 3, Pl. vi. Optic disc atrophic. From it extend two broad bands of organized exudation, growing wider toward the periphery, where they end in accumulations of pigment. One extends upward and outward, the other downward and inward. The upper-inner third of the fundus included between them is normal. Outward from the disc, however, are a number of tendinous white stripes in the retina, having a straight or slightly curved course. Some of them are bordered with pigment. Along one exudation-wall lies a long regular striation, as straight as a string, extending far into the periphery, while in the other wall are several interlacing striations. The patient's lack of intelligence prevented me from getting any history of the case.

It should be noted that in cases 2 and 3 no change took place in the fundus during the many weeks they were kept under observation.

From what has preceded, it is clear how Case 3 is to be interpreted. There was originally a detachment of the retina involving all but the inner-upper third. The two exudation-walls definitely indicate such a partial detachment. The retina later became reapplied with the organization of some fibrinous stripes left between retina and choroid.

In speaking of the organization of coagulated masses, I do not mean to claim that fibrin may be directly transformed into connective tissue. This expression has been employed only for the sake of brevity. It is evident that such stripes of fibrin may be replaced by connective tissue from the choroid growing into them, with which process there would naturally be, as with plastic processes in the choroid in general, a displacement as well as a proliferation of uveal pigment. We need not consider these processes here, but it is sufficient for us to regard as firmly grounded the view, in the light of the three reported cases, that the so-called retinal striations represent nothing but a rare final stage of detachment of the retina. Hereafter there will be no occasion for anyone to speak of a distinct chorio-retinitis striata.

A fourth case that was seen last year shows how the healing process may remain half finished. The patient declared that he had been almost blind in one eye from early youth. $V = \frac{8}{60}$, excentric, with the retina totally detached, except just above and outward from the disc. In this place there was a lustrous white retinal striation, continuous with which were some coagulation-figures beneath the detached retina. The appearance of this striation may be judged from the fact that it had years before been mistaken for a congenital rupture of the choroid. Its relation to the neighboring coagulation-figures, however, left no doubt as to its true nature. The visual field was much narrowed, particularly above. The other eye had normal vision. Further notes of the case are wanting, since it was only under transitory observation.

THE REMOVAL OF A PIECE OF STEEL FROM THE INTERIOR OF THE EYE BY THE USE OF THE ELECTRO-MAGNET OF HAAB.

By JOHN E. WEEKS, M.D., New York.

(*With two figures.*)

August S., æt. fifteen years, came to my office on May 3, 1896, and gave the following history: About eighteen hours before, while playing with two hammers, striking one against the other, a bit of steel broke off and struck him in the left eye. The patient first visited the Manhattan Eye and Ear Hospital, and afterwards consulted Dr. Herman Knapp, who kindly sent him to me with the request that a trial be made to remove the foreign body, with the large electro-magnet in possession of the New York Eye and Ear Infirmary.

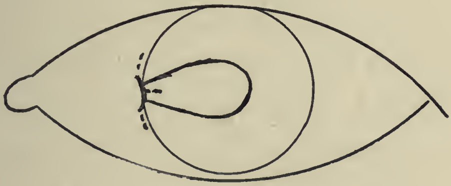

Fig. 1.

The heavy curved line at the limbus represents the original wound; dotted lines indicate the direction and extent of the enlargement.

St. pr.—A small curved wound two and one-half millimetres in length, from which a bead of vitreous and a piece of iris protrudes, is observed at the limbus conjunctivæ to the inner margin of the cornea and on the horizontal meridian of the globe (see Fig. 1). The anterior chamber is partly filled with blood. Pupil oval and drawn to the nasal side, it measures five by eight and one-half millimetres. There is some blood in the vitreous chamber. Tension — 2. Vision = $\frac{1}{00}$ perception of light.

The patient was immediately sent to the Eye and Ear Infirmary, admitted on my service and prepared for operation. Dr. Knapp and many others were present at the operation.

Under cocaine anæsthesia, the prolapsing iris and vitreous were excised. The wound was then enlarged by continuing the incision in the limbus above and below, two millimetres at each end, and by making an incision two millimetres long into the corneal tissue, at right angles with the vertical incision: the whole forming a T-shaped wound. The patient was then approached to the sterilized point of the large magnet, and when the eye was within about four millimetres from the conical end of the magnet, the piece of steel flew from the wound in the eyeball and adhered to the point of the magnet. The pillars of the coloboma were replaced, the margins of the wound adjusted, atropine instilled and a double bandage applied. The piece of steel measured two and a half millimetres by one and a half millimetres by seventy-five hundredths millimetre. When it is known that the power of attraction of this magnet at its point is five and three-quarters pounds, for a piece of soft iron weighing eight gramms, an idea of the influence exerted on particles of steel in the immediate vicinity of the point may be obtained.

Seven days after the operation the patient left the hospital, the wound had healed and the blood had disappeared from the anterior chamber. The vitreous was hazy and remnants of a clot were present in the inner third of the vitreous chamber. There had been no pain, and no inflammatory reaction after the operation.

On August 26th, a careful examination of the eye was made. The eye was perfectly quiet. The pupil extended to the margin of the cornea and measured four by eight and a half millimetres; columns of the coloboma free. The lens was perfectly transparent. In the vitreous, well to the nasal side, a white deposit was observed, evidently the remains of a blood clot. The vision with correction (— 1.75 D. ax. 22°) equalled $\frac{20}{30}$ +. The eye has been used with its fellow without discomfort. When last seen, seven months after the accident, the conditions were virtually the same as on August 26th.

In this case, the piece of steel pierced the fibrous coat at the limbus, passed through iris and suspensory ligament and lodged in the vitreous humor, not injuring the lens (see Fig. 2). The result proved the wisdom of the attempt to remove the foreign body through the original wound. It is seldom that we observe recovery with useful vision, when equatorial openings into the eyeball are employed for the removal of foreign bodies.

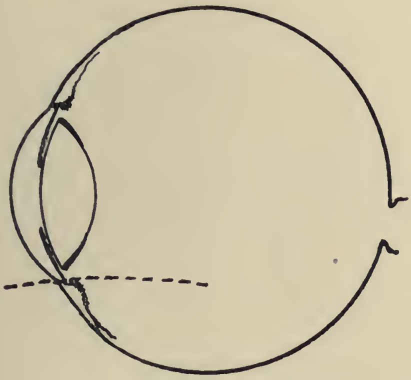

FIG. 2.
Probable track of foreign body indicated by dotted lines.

SOME REMARKS ON THE CONSERVATIVE TREATMENT OF CERTAIN PROLAPSES OF THE IRIS.

By HERMAN KNAPP.

FOR many years my attention has been aroused by the white clean scars at the periphery of the cornea to which a portion of iris is attached—the well-known adherent leucoma. The level of the cornea is unchanged, the eyeball tension normal, the pupil pear-shaped, but clean and mobile, the sight good, and the eye free from irritation. Not all adherent leucomas are so harmless, but the harmless ones are very numerous. They are the end-stage of a penetrating wound, or a perforating ulcer of the cornea, healed without infective inflammation. The ulcers may, however, have been the consequence of an infective inflammation, for instance of pustular keratitis or blennorrhoic conjunctivitis, but the infection, in these cases, did not penetrate into the interior of the eyeball. I have long made it a point in prolapses of this kind not to touch the protruding iris, for it plugs the gap and thus prevents the contagium from entering into the interior of the globe. I have even seen cases of blennorrhoic conjunctivitis in which a considerable portion of iris lying in a crescentic corneal ulcer of the lower or upper periphery of the cornea, was afterward drawn back into the anterior chamber. The perforation healed with a grayish-white scar, but the pupil became central and round again. These cases are exceptional. The majority heal with an adherent leucoma without serious consequences, others become ectatic and produce glaucoma, others again lead to panophthalmitis. The latter unfortunate termination, as far as my experience goes, is favored by interfering with the prolapse, be it by cutting or cautery. I have therefore *made it a rule never to cut or burn off protruding iris in any infective conjunctival or corneal disease.* I treat the original disease, instil atropine in moderate quantity to keep the pupil dilated as far as possible without irritating the conjunctiva and producing granulations, and I cleanse the conjunctival sac with a mild antiseptic solution, for instance chloride of sodium (chemically pure)0.40 to 60.00 grams.

Having for years carefully watched the healing process of perforating corneal wounds I venture to put myself on record with the statement *that I do not remember a single case of sympathetic ophthalmia from any kind of prolapse, if the iris had not been wounded by an accident or by the hand of the surgeon.* This statement I beg, however, to consider as personal, for I am only one observer, and the experience of others may differ. In favor of this assertion are certain bacteriological observations which, in the winter of 1885 and 1886, I made in KOCH'S Laboratory in Berlin and later in my own in New York. While studying the action of pathogenic bacteria on perforating wounds of the cornea, especially in cataract sections, I noticed that the corneal tissue adjacent to the wound was densely infiltrated with staphylococcus pyogenes, whereas the tissue of the prolapsed iris was free from them.[1] Guided by these principles I have for a long time been conservative in the treatment of iris prolapse, too conservative probably in one particular field, the iris prolapse following cataract extraction. The prolapses in this field very rarely occasioned the loss of the eye by inflammation, but frequently larger prolapses caused such a disfigurement and so high a degree of astigmatism that the results of the operations left a great deal to be desired. During the last years I have therefore made it a routine practice to inspect every eye a day after the extraction, be there any irritative symptoms or not, and abscise the iris, if prolapsed, at once, provided that there be no septic inflammation. In this way the protruding iris can mostly be removed cleanly, *i. e.*, without incarceration of the limbs of the coloboma. My associate at the N. Y. Ophthalmic and Aural Institute, Dr. R. O. Born, has dealt with iris prolapse after extraction in the same manner longer than myself. This management of the prolapse is, in fact, only the application to cataract extraction of a general rule long known and followed by many ophthalmic surgeons, viz.: excise the iris when it is still possible to make a clean iridectomy.

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[1] See my paper "On the Action of Bacteria on the Operations of the Eye." ARCHIVES OF OPHTH., xv., pp. 31 and 32.

To *restrict this general rule is my chief object in writing this communication.* Whenever a case came under my care in which I could expect that there would be no inflammation and the prolapsed portion of iris small or large be eliminated by nature, I treated the case expectantly as long as no threatening symptoms appeared. This was particularly my rule when the injury did not involve the lens. I have treated in this way not only the prolapsed iris but also the ciliary body. Of the numerous cases of felicitous healing that are at my disposal I beg to detail only two, the one in a corneal, the other a scleral wound.

CASE I.—**Wound through the whole Breadth of the Cornea with Extensive Prolapse of the Iris—Perfect Recovery.**

The right eye of the six-year-old son of General Hy. L. B., of New York, had been hit with a pointed lead pencil. He was brought from Newport to New York the next day, October 26, 1890. A curvilinear wound passed from the temporal to the nasal border through the upper third of the cornea. It was filled with iris; the lens was uninjured, and sight fairly good. There was no irritation. I told the parents that the injury was grave, and the eye might be lost, even the danger of the loss of the other eye from sympathetic affection could not absolutely be excluded. Yet there was a fair prospect to heal the wound without notable disfigurement, and with preservation of good sight. If he were my child, I would treat him conservatively, watch him attentively, and act according to events. The parents said: "We place him into your hands without any recommendation or restriction." I cleansed the eye, instilled atropine and boric acid, bandaged both eyes, and kept the boy, who was an intelligent and tractable patient, in bed. The prolapse soon began to swell, yet there was no inflammation, the pupil was medium-sized and clear, the vision good, and the fundus oculi normal. Gradually the base of the prolapse contracted, and on the thirteenth day the protruded iris, swollen like a mushroom, began to shrink.

On the 17*th day* the prolapse showed a tendency to disappear on the temporal side. The corneal lips of the wound were separated by a thin, filmy, not elevated tissue. On the nasal half the protrusion and swelling persisted. No irritation.

On the 23*d day* there was protrusion only on the nasal side. Slight redness and distinct swelling were noticed on the upper and lower margins of the optic disc, and the retina was congested. No irritation.

On the 25*th*: Treatment:—strict rest in bed; room darkened. No redness of eye, swelling and congestion of retina less. Tn. V good. The protruded part of the iris on the nasal side of the wound had assumed a cyst-like character, but it also soon began to contract, and had disappeared *forty days* after the injury. The swelling and congestion of the optic disc and retina were noticeable until the *fifty-fourth day* after the operation, when the wound presented a perfectly smooth linear scar in the cornea, the iris was normal, the pupil clear, not drawn upward, though the upper part of the iris adhered to the scar. The media and background of the eye presented no morbid change. On the last of December, 1890, sixty-seven days after the injury, the scar was smooth, the eye perfectly free from irritation, had been used with the other, without discomfort, and had $V = \frac{20}{40}$—with $+ 2.^{s} + 1.^{c}$ axis horizontal. Since that time I have seen the patient repeatedly, last in January, 1897. With Placido marked astigmatism with axis against the rule was noted. With ophthalmometer the astigmatism was 7. D, axis 75° temporally. With the opthalmoscope the optic disc appeared vertically oval when seen in the inverted image through the part of the cornea near the scar, but round when seen through the lower part. With + 6. D c 80° temporal deviation V $\frac{20}{50}$. The wounded eye had not changed, and both eyes were used for all purposes without the least inconvenience.

CASE II.—Large Perforating Wound of Upper Lid and Sclera, with Prolapse of Vitreous and Ciliary Processes—Perfect Recovery.

Mrs. Mollie W., a thirty-year-old waitress, injured her right eye in June, 1896, at Long Branch. A piece of glass from an exploding Apolinaris bottle struck the upper lid and the ball of the right eye. Dr. Bennett, residing at the time in Long Branch, had immediately been called. He stitched the lacerated upper lid, and kept the eye closed with a pressure bandage until I saw the patient with him, six hours later. The lips of the perforating wound of the upper lid had been carefully united, the eyeball and lids were free from inflammation, but a perforating wound in the upper part of the sclera extended from near the equator of the globe on the temporal side obliquely forward into the ciliary region on the nasal side. The wound was gaping and filled with vitreous on the nasal and with ciliary processes on the temporal side. Lens and iris were uninjured, sight preserved. The treatment consisted in keeping the eye closed with a compressive bandage, and letting the patient remain in bed for three weeks. During this period the dressing was changed several times. No inflammation setting in, we abstained from any other treatment except the instillation of a drop of atropine now and then. In this way the temporal two-thirds of the wound cicatrized regularly, but the nasal part, where the ciliary processes protruded through the gap, developed into an oblong cyst consisting of ciliary processes and a transparent wall, connected with the edges of the wound and projecting 2–3 *mm* above the surface of the sclerotic.

The eye and sight being in a good condition, but the cyst showing no tendency to disappear, on the contrary, to slowly grow larger, I admitted the patient to the N. Y. Ophthalmic and Aural Institute September 20th, where I exsected the whole cyst clean out of its surroundings, paring the edges of the scleral wound with a strong pair of delicate scissors (Stevens's). No tissue of the ciliary body was left in the wound. Clear vitreous protruded. The wound was not stitched, but left to unite under a simple compressive bandage. The patient was discharged from the hospital October 5, 1896.

On December 22, 1896, I examined her at my office. The whole wound had smoothly cicatrized. The pupil was large, immovable. The fundus was normal. Nothing of the scar could be seen with the ophthalmoscope. The ophthalmometer showed 4. D of astigmatism against the rule in the injured eye, and 1. D with the rule in the other. With — 3.5^c ax. 10° of temp. deflection from the vertical meridian before the injured eye $V = \frac{20}{40}$ —, with — 1^c axis horizontal (with the rule) $V = \frac{20}{40}$ in the other eye

With the injured eye she read Jäger 1 at 6″–9″ with + 3. D, the pupil still being dilated and immovable.

The first case demonstrates that conservative treatment of the prolapse of the iris through the *cornea* may produce results that could not be surpassed, if at all equalled, by any operation. If the latter have the advantage of healing the wound more quickly, I would say that, to me at least, the conservative treatment appears safer and cleaner. It is notable that in seven years the astigmatism had increased from 1. D to 7. D, showing the contraction of the extensive scar.

The second case is an example of the fact that clean perforating wounds of the sclerotic commonly heal kindly, whereas prolapses of the ciliary processes, like prolapses of the iris in the ciliary region, are apt to produce cyst-like ectasias which for their cure require thorough excision.

TRANSACTIONS OF THE TWENTY-FIFTH OPHTHALMOLOGICAL CONGRESS, HELD IN HEIDELBERG, AUG. 5 TO 8, 1896.

REPORTED BY PROF. HORSTMANN AND DR. GREEFF (Berlin).

Translation by ADOLPH O. PHINGST, M.D., Louisville, Ky.

The twenty-fifth meeting of the Ophthalmological Society was characterized by an unusually large attendance and by the large number of papers that were read. Especial interest was added to the meeting by the bestowal of the Graefe medal, which is presented every ten years.

After a few appropriate words of welcome by Dr. Hess of Mainz, the permanent secretary of the Society, Prof. von Hippel of Halle, made the address of the day, in which he eulogized the achievements of A. von Graefe in ophthalmology, and briefly reviewed his illustrious career. At the close of the address the medal was presented to Prof. Leber, who thanked the body in an eloquent address.

FIRST SESSION.

The first business meeting, which was held on August 6th, and presided over by Mr. Swanzy of Dublin, was opened by Dr. Nieden of Bochum, who read a paper on *the use of cancer serum of Emmerich-Scholl and formol in inoperable tumors of the eye.* Nieden cited two such cases from his practice upon which the serum had been used without benefit; in fact, it seemed as though the growth had been more rapid after its use.

The first case was a melanotic sarcoma filling the entire orbit, recurring after enucleation of the eye a year previously. The injection of serum was begun with 1 decigr. and afterwards increased to 2 decigr. The tumor was, after several injections, seen to be growing more rapidly than before.

The second case was a glioma retinæ filling the orbit, which had recurred six weeks after removal of the eye and infiltrated nerve. Fourteen injections, the first in the periphery and then in the growth proper, had been made in four weeks. After the tenth injection a more rapid growth of the tumor was noticeable.

On the surface necrosis of the pseudoplasm had taken place. To overcome the odor in this condition and prevent new tissue involvement a 2 % solution of formol was found to be of service.

2. Prof. Hess, of Leipzig, presented a paper on *some new observations on the displacement of the lens during accommodation.*

Hess observed that the entoptic image of his lens gravitated slightly during accommodation. Accordingly, as the head turned from the erect position toward the right or left side, the lens moved in the same direction. With the head bowed forward it shifted towards the forehead side—a direction just contrary to the one with the head erect. Hess measured the displacement and found it to be from 0.16 to 0.2 *mm.* By the instillation of eserine this could be increased to 0.42 *mm.*

Hess had also, with the aid of new methods, determined the near point of accommodation, and found that it was perceptibly nearer to the eye when the head was lowered than when it was raised. There was a refractive difference of $\frac{1}{2}-\frac{3}{4}$ D. He concluded from this fact that there was a forward displacement of the lens of 0.15–0.18 *mm.*

Hess showed why his experiments refuted the hypothesis of Schön and Tscherning, and expressed confidence in the practical benefits of his researches.

3. Dr. Czellitzer (Heidelberg) : *On zonular tension and the changes in shape which the lens undergoes during accommodation.*

Stimulated by the recent experiments of Tscherning, contradicting the theory of Helmholtz as to the changes in the shape of the lens during accommodation, Czellitzer made a number of measurements of the lens surface during rigidity and relaxation of the suspensory ligament. He brought about the changes in the zonula in three ways, viz., by increasing the tension in the vitreous chamber or by reducing it in the anterior aqueous chamber, either of which would cause the lens to move forward and stretch the zonula, or by the use of a special devise by means of which he could secure uniform tension or relaxation of the suspensory ligaments as he desired. He was also able by means of this apparatus to bring any part of the lens surface into the field of the ophthalmometer (of Helmholtz). The result of these experiments was also contradictory to the theory of Helmholtz. He found that during relaxation of the zonula the radius of curvature of the vertical meridian became larger, and not as Helmholtz had supposed, smaller. It gradually became smaller on both sides of the median line as it approached the zonula attachment; especially was this so of the anterior surface. During tension of the zonula the radii of curvature of the vertical meridians diminished. It was, in other words, the action of the suspensory ligament which caused the increase in curvature of the vertical meridian. This increase extended about 15° to each side of the median line, where there was a zone upon which the tension of the zonula had no effect (*Indifferente Zone*). Beyond this the tension produced a flattening of the surface.

Czellitzer's experiments were made upon calf and ox eyes; nevertheless, if the elasticity of the human lens is nearly the same as in those used in the experiments, we may assume that the changes in the human eye during accommodation do not differ from those in the animal eye, and that the generally accepted theory of accommodation is an erroneous one.

In the discussion Hess and Sattler both expressed the belief that there was considerable difference in the changes brought about by accommodation in man and in lower animals.

4. Dr. von Hippel (Heidelberg): *On the degenerative changes of the retina which result from the presence of particles of iron within it.* (Abstract submitted by author.)

Late researches have shown that the presence of particles of iron in the fundus of the eye could cause total degeneration of the retina, without causing detachment. Earlier observations by other authors have led to a classification of four symptoms in these cases.

(1) Amblyopia, proportionately greater than the changes in the refractive media or the fundus would indicate.

(2) Concentric contraction of the visual field.

(3) Hemeralopia.

(4) Diminished acuteness for the perception of colors.

Von Hippel had gathered 45 cases from the literature in which particles of iron had been carried in the eyes for years, without perceptibly affecting them. No mention was made of symptoms

3 and 4 in any of these cases, but as symptoms 1 and 2 had been noted in 8 of the number, it would justify the supposition that they were cases in which degenerative changes had taken place. The remaining cases showed that bodies may remain in the retina a long time without causing changes. No significance should be attached to the size of the foreign body. None of the eight pieces of iron in the cases referred to had become firmly encapsulated, and some were entirely free. In 15 cases where no degenerative changes had taken place, all of 9 eyes which could be examined showed a dense capsule surrounding the foreign body. Statistics and anatomical examinations by Leber and the author have shown that such capsule formation does not take place when the body introduced is in a sterile condition, but that they are the result of inflammatory action set up by septic material introduced with the body.

Von Hippel observed hemeralopia to be the earliest sign of retinal degeneration. He found it present in a marked degree in 5 and to a less degree in 2 cases. Concentric contraction of the V. F. was present in but 3 of these cases. Whether or not the hemeralopia is always followed by diminution of vision is not positively known.

Discussion : Hirschberg mentioned a case where glaucoma had occurred twenty years after the body had entered the eye, and was not relieved by removal of the body.

Vossius expressed the belief that degeneration precedes the diminution of vision.

Dor gave his results of the treatment of detachment of the retina with Heurteloup and cautery. Nine out of 15 cases had been cured. He pointed out the fact that the vision for colors returns only in new cases. In old cases, though they may be cured, the defective vision for colors remains.

5. Prof. GOLDZIEHER (Budapest) : (1) *On retinitis proliferans.*

Based upon clinical observations, G. refutes the general supposition that the characteristic changes which take place in this disease are caused by recurrent retinal hemorrhages. Even in such cases where hemorrhage is observed during the progress of the disease, there is doubt in his mind as to their relation to the changes spoken of ; they could just as well have resulted from some diseased condition of the retina, causing rigidity of the blood-vessels. It is a noticeable fact that retinitis proliferans

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occurs rather infrequently when compared with the large number of retinal hemorrhages, which are seen. Large preretinal clots become absorbed (Haab) without leaving a trace. In syphilitic cases, which differ somewhat from the simple forms (Jaeger, Manz), the specific trouble and not the hemorrhages is responsible for the changes, though the proliferations are adherent to the blood-vessels. They are products of a syphilitic endo- or peri-arteritis.

G. stated further that these cases of proliferation into the vitreous from the retina, following traumatism, are caused by plastic chorio-retinitis. They differ both clinically and microscopically from a genuine or spontaneous retinitis proliferans. There are also cases of this spontaneous variety which have existed for years without a sign of hemorrhage or a diseased condition of the vessels. The author thinks that the changes in these cases are brought about by a proliferation of Müller's fibres.

(2) *Hutchinson's changes in the fundus.* GOLDZIEHER was able to show that the retinal affection described by him under this name (*Wiener Med. Wochenschrift*, 1887), is identical with retinitis circinata of Fuchs. He had observed 9 cases, from which it was evident that the changes were due to a general sclerosis with secondary degeneration of the retina. He sided with Fuchs in that he did not look upon the characteristic specks in the retina as accumulations of fat the outcome of hemorrhages, as was suggested by Wecker. G. thought that a circumscribed breaking down or softening took place in the retina, the same as it does in the cortex of the brain, the result of occlusion of isolated arterioles or capillaries.

(6) Dr. SIEGERT, Bâle: *A rare affection of the retina.* The case had been reported by Weltert (*Arch. f. Augenheilk*, xxxii.) as one of retinitis circinata. There was a white luminous mass at the macula from which numerous stripes radiated towards the periphery. The retinal vessels were in front of both. In the upper and outer periphery of the retina a white patch was seen, with hemorrhages and dilated veins.

The eye trouble was ushered in by sudden severe heart symptoms, from which the child had been a lifelong sufferer.

After the use of iodide of potash for several weeks the stripes referred to became sharply defined and arborescent. Paracentesis of the anterior chamber was then made with the result that the white figures lost their sharp outlines and soon coalesced to be changed into white dots or beads. The same changes could be brought about with digitalis and caffeine. Under the administration of iodide of potash they returned to the form which the use of this drug had previously given them.

This case was hardly one of retinitis circinata, because in this we never find the macula affected nor have a radiary arrangement of the retinal deposits. The age of the patient and the sudden onset of the condition are also not suggestive of retinitis circinata.

The cited case was supposed by Siegert to be due to a weak action of the heart with consequent disturbance of the circulation in the retinal vessels. The white deposits were supposed to be albuminous transudations and not fatty degenerations. As the retinal vessels had remained visible over the patches the odœma was evidently in the outer layers of the retina and the author has referred to the condition as external œdema of the retina in contradistinction to the internal œdema of the retina accompanying embolus of central artery, etc.

7. Prof. SCHMIDT-RIMPLER (Göttingen) : *Temporal optic atrophy as a complication of diabetes.*

S. had found the nerve affected 34 times out of 140 cases of diabetes. There was, as a rule, a central scotoma for colors brought about by retrobulbar neuritis. On account of this Sch.-R. suggested that diabetes should always be suspected in cases having central scotoma. The urine should be examined frequently and on different days, as it may be free of sugar for several days, and in this way be overlooked. A central scotoma should be accurately tested with small objects. The scotoma in such cases is not, as Mauthner and others have supposed, due to tobacco or alcohol poisoning.

The prognosis of these cases is not unfavorable if the proper attention be given the case. The use of tobacco should be prohibited. The enforcement of a strictly anti-diabetic diet is at the present day not supposed to be of paramount importance.

In a case examined microscopically by the author, in which central scotoma had existed, changes were found in the papillo-macular nerve fibres identical with the changes found after amblyopia of intoxication, though there was no history of the abuse of alcohol or tobacco.

In the discussion Leber's views coincided with the above. He called attention to the fact that 30 cases of nerve affection following diabetes observed by him all befell the male sex.

Hirschberg had observed a case in a woman.

Uhthoff emphasizes the fact that there is no difference clinically between amblyopia of intoxication and the scotoma of diabetes.

8. Dr. Straub (Amsterdam) *: On hyalitis and genuine uveitis.* The term cyclitis embodies in it to-day cases in which either the vitreous body or the uvea is affected, although more strictly speaking the former is termed hyalitis and the latter uveitis. S. was able in rabbits to produce either condition and to submit the eyes to a microscopical examination. In hyalitis leucocytes were found in the vitreous, retina, and in the capillary layer of the uveal tract. In three of the cases genuine uveitis had occurred, leaving clear vitreous. All of the cases had produced sympathetic ophthalmia.

9. Dr. Greeff (Berlin) : *Anatomical study of pseudo-glioma and pseudo-growths of the eye.*

From a number of examinations made by G. he concluded that the most valuable means of distinguishing between true and false growths of the eye is the examination of the fresh specimen. In the fresh state true glioma presents characteristics which can be seen macroscopically and which make its recognition easy. It is a soft brain-like mass of a gray color. We are frequently unable to distinguish clinically between glioma and exudative choroiditis as both present the same yellow mass on the interior of the eye. In making a fresh section of an eye containing pseudo-gliomatous exudation, an opaque yellowish fluid escapes from beneath the retina in which a great number of minute glistening bodies can be seen (crystals of cholesterin). A dense layer made up of pus and fat cells, and cholesterin crystals was observed upon the choroidal side of the retina which accounts for yellow mass resembling glioma. In old cases this membrane had become organized. These cases of choroiditis result, as a rule, from some infectious disease as cerebro-spinal meningitis, scarlet fever, measles, tuberculosis, or congenital syphilis. The choroiditis is produced no doubt by an embolus which has been carried into one of the choroidal vessels.

10. Prof. Hirschberg (Berlin) : *On carcinoma arising from posterior layer of the iris.*

A tumor emanating from the posterior or retinal layer of the iris was observed by H. It occurred in a man twenty-six years old, whose vision had been defective for one and a half years. The iris above was pushed forwards against the cornea. After fourteen days the tumor could be seen as an elevated body upon the posterior surface of the iris. The eye was enucleated for the relief of pain and the growth examined microscopically. It had a spongy texture and emanated from the posterior layer of the iris. The epithelial cells resembled, in their arrangement, gland tubules and alveoli and the growth was consequently looked upon as an alveolar carcinoma. These growths are very infrequent, Michel and Treacher Collins having reported similar cases.

SECOND SESSION, AUGUST 7TH.

1. Prof. SATTLER (Leipzig) : *On the elastic fibres of the sclera with demonstrations.* By the use of the method of Spaltenholz, which stains the elastic fibres black with a yellow background, S. demonstrated that the elastic fibres of the sclera are very delicate and that they are arranged parallel to the bundles of connective tissue. There is no bifurcation or anastomosis of the fibres. They predominate near the insertion of the muscles and in Tenon's capsule.

2. Dr. HOFFMANN (Baden) : *An operation for the extirpation of the lachrymal sack and one for ectropion.*

The author believes that in suppuration of the sack we can, by its removal through the conjunctiva with canaliculi, make a more aseptic field for cataract operations than by the old method of extirpation leaving the canaliculi. The operation is facilitated by injecting cocaine between the internal palpebral ligament and the sack and in the connective tissue behind the sack. The sack is then removed with forceps and scissors. The conjunctiva should be sutured to the skin, to get union by first intention.

The best operation for senile ectropion is to excise a triangular piece whose apex is directed toward the external canthus and base towards zygoma. Sutures are passed so that in entropion the upper lid overlaps the lower at the outer canthus. In ectropion the lower lid is brought in front of the upper.

3. Prof. SCHIRMER (Greifswald) : *A radical operation for circumscribed staphylomas* (*ant.*) *of the sclera.*

As the methods of treating staphylomatous conditions of the sclera are unsatisfactory, Schirmer tried the plan of abscission, as it is employed for staphyloma of the cornea. The ectasia must be excised in toto as the walls are too thin to hold sutures. The opening is closed with silver wire and the defect covered over with conjunctiva to avoid subsequent infection. The wire is removed after 14 days. Schirmer had operated three cases successfully, two of them showing an improvement in vision. Discussion : Schweigger has operated according to this method. He uses cat-gut thread.

4. Dr. AXENFELD (Marburg) : *A contribution to the etiology of conjunctivitis.*

The pathogenic agents known to us (Koch-Weeks's bacillus, pneumococcus, streptococcus, Morax diplobacillus, micrococcus conj. minutissimus of Bach) by no means exhaust the etiology of simple conjunctivitis. There is in fact no certainty about the specific character of any of them. Axenfeld has never been able, for instance, to find the bacillus of Koch-Weeks in Marburg. Pneumococcus conjunctivitis was, on the other hand, frequently found. It appeared mostly in children and ran a mild course. The exceptional cases seen in the adult were all more severe. A number of the cases showed a resemblance to phlyctenular conjunctivitis, and in a few there were true phlyctenula present.

The pneumococcus was demonstrable in great numbers during the suppurative stage. They were recognizable by their characteristic shape and arrangement as well as by their reaction to Gram's staining method.

Strange to say, although these organisms were found predominating in two different school epidemics, neither the secreted material nor the organisms obtained in pure culture from the secretion had any effect when inoculated into the healthy eye. The contagious character of pneumococcus conjunctivitis consequently is doubtful. It is possible that through some influence the organisms which are normally present upon the healthy conjunctiva take on such properties as to cause the epidemic.

In the discussion Peters and Fuchs claimed never to have been able to find the Koch-Weeks's bacillus. Peters had often found the diplobacillus of Morax. Von Hippel reported to have seen conjunctivitis set up by virulent diphtheria bacilli without the formation of a pseudo-membrane. Mayweg thought that the epidemics spread by infection through the air.

5. Prof. LEBER (Heidelberg) : *The pathology of trachoma.*

Little is known to-day of the etiology of trachoma. Many, including the author, had endeavored to find a specific organism for this disease. It is hard to say which of the many organisms found in the lids has to do with the production of trachoma.

None of them have been found in the tissue proper, although that fact by no means excludes the possibility of their presence there. Leber found peculiar bonnet-shaped bodies filling the follicles, which he termed the corpuscular cells. They are the same bodies which were looked upon by Pfeiffer as parasites, and which Villars called Trachozytes. Their significance is not known. The author at one time thought of the possibility of their being parasites, but abandoned this after having found them in normal follicles.

Discussion : Schmidt-Rimpler suggested that examination into the etiology of trachoma be directed towards the secretion, as it is this which is so contagious.

Sattler said that German of St. Petersburg had found organisms in trachoma which are present in the soil. From this we would infer that the disease has an endemic character.

6. Prof. FUCHS (Vienna) : *Fungus growths upon the conjunctiva.*

Fuchs found small fungus patches upon the convex border of the tarsal cartilage upon several occasions. Upon removing them yellow bodies were seen in the conjunctiva. The patches on the surface were found to contain round and oval bodies (microscopic), which the bacteriological examination (Gruber's) showed to contain a variety of leptothrix. The patches did not return when removed. The yellow bodies in the conjunctiva spoken of were concrements of epithelium. The fungi had not entered the depth.

7. Prof. VOSSIUS (Giessen) : *A case of cyst-formation of the conjunctiva of the upper lid with demonstrations.*

Vossius had treated a patient in which small excrescences were present upon the conjunctival surface of both lids. They could not be scraped off, but burst during the effort to scrape them off, discharging a yellow fluid. The excised bodies were found, microscopically, to be made up of cysts of different sizes. They had no connection with the Meibomian glands. Some of the cysts were separated by delicate septa and some communicated by small openings. There were also openings upon the surface. A double layer of endothelium lined the interior. The fluid contents contained cholesterin crystals, but no micro-organisms. The case was no doubt one of cyst-formation of the glands of Henle.

8. Dr. GELPKE (Karlsruhe) : *On the etiology of acute epidemic conjunctivitis.*

Gelpke had examined the children of two schools during an epidemic of conjunctivitis, in which he found 22 % of the children affected, all within two days. The cases ran a favorable course, terminating in from 7 to 8 weeks.

The discharge was examined bacteriologically. Upon bouillon agar containing about 6 % glycerine, small glossy colonies were grown, which under favorable environments spread over the entire surface. The organism resembled the xerosis bacillus.

Discussion : Peters thought the organism resembled the bacillus of Morax.

v. Hippel, Sr., protested against the promiscuous introduction of organisms of unknown characters into the human eye.

Prof. GRŒNOW (Breslau) : *The use of cocaine in glaucomatous conditions.* Text-books warn against the use of cocaine in glaucoma. G. had seen cases where the drug had a beneficial action upon glaucomatous eyes. It is not new to any one that none of the medicinal treatment will cure glaucoma, still we are often called upon to hold the process in abatement until an iridectomy can be performed. A two per cent solution of cocaine answers the purpose admirably. It has the advantage over eserine that it relieves pain and lessens the tendency to the formation of synechia.

Discussion : Schmidt-Rimpler had observed a case in which eserine brought on pain and increased the tension.

Schirmer had seen a similar case. Cocaine had given relief.

THIRD SESSION, AUGUST 8TH.

1. Prof. PFLÜGER (Bern) : *On parenchymatous keratitis.* P. believes that the causes of parenchymatous keratitis are manifold. All of the infectious troubles which may lead to uveitis may also lead to parenchymatous keratitis. The author mentions three etiological factors of which little mention is made in literature.

I. Agalactia contagiosa, an epidemic disease observed among goats by Hess and Guillebeau, veterinary surgeons in Bern. During the epidemic P. had occasion to see a number of the diseased cattle. The interstitial keratitis seen by him resembled very much that which follows influenza in the human. In the animals, however, there was a peculiar pigmentation of the cornea, and an ulceration, no doubt, of a traumatic character.

II. Pflüger calls attention to the relation of uveitis and parenchymatous keratitis to chronic skin lesions. He had seen two cases of psoriasis and one of lichen ruber which had led to parenchymatous keratitis.

III. Author also told of the frequency with which parenchymatous keratitis follows influenza. He had observed it in thirty cases. He distinguishes between three forms.

a. The typical form occurring in old non-syphilitic individuals, which affects one eye, usually involving the iris.

b. A variety closely resembling the form described by Stellwag as k. annularis.

c. A variety complicated with sero-fibrinous iritis in which the exudation covers the entire posterior surface of the cornea, and in which interesting phenomena can be observed in the circulatory system with the aid of large lens.

Discussion: Axenfeld had seen k. parenchymatosa following influenza on three occasions. Hirschberg spoke of the interstitial keratitis occurring in children to whom syphilis had been transmitted by the wet-nurse.

2. Prof. WAGENMANN (Jena): *Remarks on the eye complications in gout.* In the course of time the author has observed a number of eye troubles which he could attribute to existing gout. They consist in a sero-plastic inflammation in which there may or may not be a deposit of uric acid salts. For example, W. cited cases of scleritis, irido-cyclitis with a deposit between the retina and choroid, lumpy deposits in the sclera, and a characteristic case of episcleritis periodica fugax. Gout is also indirectly responsible for eye affections through the production of an early atheromatous condition of the arteries. Recurring opacities in the vitreous, which may finally lead to cataract or detachment of the retina, also come under this category. There may further be certain changes of the cornea characterized by a sclerous condition. There is also some connection between gout and glaucoma.

Discussion: Nieden shared the views of W., and thought that recurring opacities of the vitreous were characteristic of gout.

Pflüger had seen cases of episcleritis fungax, recurring vitreous opacities and glaucoma resulting from gout.

Hirschberg had seen a crystalline deposit in the region of the macula. He also had observed severe recurrent iritis.

Alexander remarked that Snellen had previously shown that the vessels of the eye could become choked up with a deposit of urates.

Horstmann had, in eyes which were otherwise normal, observed band-like opacities in the cornea. When he sees these opacities he suspects gout.

3. Dr. Darier (Paris) : *The importance of local agents in infectious or sympathetic irido-choroiditis.* D. presented the histories of a number of sympathetic affections where beneficial results had been derived from subconjunctival injections. For two months after the enucleation inunctions and hypodermic injections of cyanide of mercury had been resorted to. This was followed by subconjunctival injections.

When signs of phthises of the other eye were beginning to make their appearance, a hypodermic syringe of cyanide of mercury 1 to 5000 was injected at the equator. At the same time paracentesis of the anterior chamber was made, in this way increasing osmosis. After eight injections V had increased to $\frac{1}{3}$.

4. Prof. Weiss (Mannheim) : *The transplantation of conjunctiva to prevent prolapse of iris.* Weiss had with good results covered ulcers of the cornea with a conjunctival flap. This procedure had not only prevented prolapse of the iris, but caused the ulcer to cleanse itself. The conjunctiva healed to the surface without infiltration having taken place. Krüger preferred galvanocaustic treatment of the prolapse.

5. Dr. Alexander (Aachen) : *Return of function after embolism of central artery of six years' standing.* A case was reported by A. in which, after the existence of an embolus for six years, the function of the eye had been restored. When the patient, a man of fifty-one, was first seen he presented the typical fundus of an embolism. Under the use of digitalis the V soon rose to $\frac{1}{10}$. It afterwards rose to $\frac{1}{5}$, which remained permanent. Author accounted for the return of vision in this case in a possible partial obstruction of the artery, and that the increased pressure brought about by digitalis forced blood into the partially obstructed vessel.

6. Dr. Fukala : *A suggestion as to the best way of designating high degrees of myopia and hypermetropia.* High degrees of myopia and hypermetropia are best designated by the number of the lens necessary to convert the rays emanating from the eye into parallel rays, plus the distance of the glass from the eye.

Dr. Wolff (Berlin) : *Advancement of the levat. palpeb. sup. with tenotomy of the tendon.* The method suggested by Wolff is similar to the one introduced by Schweigger for advancement of the recti muscles. The palpebral portion of the muscle is exposed by incision and dissection of the skin. A small fold (about 1 cm.) of the orbicularis and tendon of the levator palpebral, which is in close apposition to it, are grasped and cut, and the muscle caught up on two squint hooks (Schweigger). The muscle is then advanced as in Schweigger's advancement. The same result could be obtained by attacking the muscle from the conjunctival side. The lid is held in the everted position with a special clamp. The conjunctiva is dissected up, and Müller's muscle, with the levator palp. under it, exposed. The same sized piece is removed in the same manner as in the external method. Wolff recommends the method for all grades of congenital ptosis.

8. Dr. INOUYE (Japan) : *A retinal reflex.*

9. Dr. AXENFELD (Marburg) : *On the mild and innocent forms of metastatic inflammation, and on thrombosis occurring in both eyes during general sepsis.* The occurrence of internal suppurative inflammations of the eye is positive evidence that pus-generating organisms have entered the interior. It is questionable whether the septic toxine in the blood could become concentrated in the eye and produce inflammation, though it is known that other poisons circulating in the blood can cause mild forms of inflammation in the eye (interstitial optic neuritis following alcohol poisoning). It does not necessarily follow that the deposit of the pyogenic organisms themselves in the eye is always followed by a severe inflammation. The author displayed microscopic sections of a case where the pneumococcus had caused very small areas to undergo pathological changes. The areas were similar to the patches found in disseminated choroiditis.

As small as they were they showed microscopical evidence of inflammation, which differentiated them from non-inflammatory deposits in the retina.

Another condition which is not due to a local deposit of bacteria, but to a general septic condition of the blood, is the formation of venous thrombosis in the retina and choroid of both eyes. This occurs most during the puerperal state.

10. Prof. VOSSIUS (Giessen) : *Congenital microphthalmus.* Vossius showed photographs and described microscopical sections of a case in which the cause of the microphthalmus could be demonstrated in inflammatory changes, which had developed during fœtal life. He also accounts for a case of congenital vascular cataract seen by him in this way.

11. Dr. BAHR (Mannheim) : Bahr presented a case of congenital periodic exophthalmos.

DEMONSTRATIONS.

Among the demonstrations and presentation of patients and specimens were the following :

Dr. Denig—(a) Migration of foreign bodies in the anterior chamber of the eye of a rabbit. (b) A new skiascope.

Prof. Weiss—A case in which a large orbital cyst had been operated upon according to Krönlein's method.

Dr. Königshöfer presented a patient who could voluntarily move one eye inwards or outwards while the other eye remained stationary.

Prof. Uhthoff presented a keratoscope. It was in the form of a semi-circle, whose surface was covered with parallel lines of black and white, which are reflected against the cornea.

Dr. Thier had an eye showing persisting central hyaloid artery.

Prof. Leber showed specimens of trachoma and demonstrated the "filtration-manometer."

Prof. Dimmer—Demonstrations with a sciopticon. The instrument projected microscopic sections of the eye. To demonstrate the fundus of the eye, Dimmer had used the colored plates of Jaeger's atlas. He had cleared them in xylol and imbedded them as he would a section of tissue.

Dr. Wolff presented microscopical sections showing the insertion of the levator palpebræ superioris. He also showed how Schweigger's electric ophthalmoscope could, with Knauer's automatic ophthalmoscope, be made to answer the purpose of a skiascope and ophthalmoscope.

Dr. Franke presented a patient in whom he had, a year previous, transplanted skin upon the conjunctiva, and which had not changed its character.

Prof. Schmidt-Rimpler spoke of a case which he had reported in 1877, in which atrophy of both optic tracts followed atrophy of the nerve on one side.

Michel and, in recent years, Kölliker maintain that there is a complete decussation of fibres of the optic nerves in the human. Kölliker demonstrated this upon the normal eye. Merkel holds that such an examination is unreliable, that it must be made upon atrophic nerves.

Schmidt-R. demonstrated specimens of the eye of a man who had acquired phthisis of the right eye thirteen years before his death. All of the fibres of the right nerve were atrophic, those of the left one normal. Atrophic bundles were present in the optic tract on both sides. The atrophy could be followed to the cortex of the brain.

Dr. DARIER reported on the action of an extract prepared from the supra renal capsule. It caused a contraction of the blood-vessels of the eye.

Dr. DOR made a few additional remarks on the treatment of detached retina. The patient must remain in bed, if necessary for months. Heurteloup was applied to temple daily. The sclera was cauterized, at first twice, and later once a week, over the point of detachment. A Paquelin cautery was used.

Prof. HESS (Leipzig) read a paper held over from the session of the day previous, on *the excentric position of the nucleus of the lens, and the histology of lenticonus posterior*. H. demonstrated some cases with drawings and anatomical specimens. He said that lenticonus posterior was often characterized by an excentric (backwards) position of the lens nucleus. At times it is in the lenticonus itself. Hess also showed that in cases of lenticonus the posterior capsule was in early fœtal life torn, at a position between the equator and the posterior pole. The developing lens fibres grew out of the rent and formed a small body resembling the nucleus on the posterior surface of the lens.

REPORT OF THE PROCEEDINGS OF THE "SECTION ON OPHTHALMOLOGY" OF THE "SECOND PAN-AMERICAN MEDICAL CONGRESS."

HELD IN THE CITY OF MEXICO, ON NOVEMBER 16, 17, 18, AND 19, 1896.

PREPARED BY DR. J. SANTOS FERNANDEZ (HAVANA), AND DR. ROB. SATTLER (CINCINNATI).

Translation of the Spanish part by Dr. C. E. FINLAY, Havana.

Monday, November 16th.

Dr. JOSÉ RAMOS, Chairman.

The CHAIRMAN welcomed all present, especially the foreigners who had come from afar to honor Mexican Ophthalmology with their knowledge.

Dr. SANTOS FERNANDEZ, of Havana, read a paper on **Observations of cases of orbital osteo-periostitis.** He made a study of 28 cases of orbital periostitis which he had in his private practice in the course of twenty-one years, in a total of 30,500 eye patients. The number of cases in comparison to that of other eye diseases is relatively less than that found by other observers. He admits the difficulty of an early diagnosis. He considers them as mostly due to lymphatism (scrofula ?) or syphilis. Those cases due to the latter cause are readily amenable to treatment. This leads him to insist on the importance of an early clearing up of the etiology. The persistence of inflammatory lesions of the bones of the orbit and their extension to the lids seriously endanger the cornea and may be the cause of loss of sight. These periostites if not exclusively are more frequently met with among the lower classes, who, owing to want of proper care and attention, not infrequently lose their sight from this cause. In none of Dr. Santos Fernandez's cases was the frontal sinus the origin of the affection, notwithstanding that this is reputed to be the most common cause of this kind of orbital inflammation. He has more often found them due to disease of Highmore's antrum, due in its turn to some affection of the teeth. He has also seen them produced by diseases of the nose. He assigns importance in the treatment, to the use of tents of laminaria digitata, especially in timid patients on account of the relief given, and the shortening of the course through a more prompt elimination of the sequestra when there is caries.

Discussion in Spanish: Taken part in by Drs. Chavez, Chacon, Montaño, and Ramos of Mexico, and by Dr. Sattler of Cincinnati. The former stated that in Mexico the relative proportion of periostites to the number of eye patients was also small. Dr. Ramos has always been an advocate of free incisions with the object of giving exit to the pus and sequestra; he has found syphilitic periostitis very rebellious. Dr. Chavez has had more periostites of the syphilitic variety and has found them very amenable to treatment.

Discussion in English—Dr. SATTLER: "My experience with surgical treatment of caries, necrosis, and periorbitis of the walls or margin of the orbit is a little at variance with that of Dr. Santos Fernandez. The plan of treatment which I follow is to make a free opening, giving access to the seat of the disease, and give exit to pus or remove necrosed or diseased bone. If there is a tendency to retraction of the lids, they are united by inflammatory adhesions and with sutures, and the palpebral fissure temporarily closed, so as to afford protection to the eye and to prevent cicatricial contraction and lagophthalmos. This is a plan that is in my practice, in all extensive and chronic cases, resorted to, and appears to me less tedious and more satisfactory than the lengthy dilatation of the fistulous tract with sponge tents."

Dr. BRYANT, of Omaha, Neb., read, in English, a paper on **Burns of the conjunctiva.** Their treatment, he said, depends on their extent, and he employs two methods, one for the mild and the other for the severe cases. Most of the cases he has seen have been caused by hot metals and were limited in extent; in these, on the elimination of the slough he passes a squint hook under the conjunctiva along the margins of the wound;

loosening the attachments to the eyeball sufficiently to enable them to be brought together. He then sutures them with fine silk. The subsequent treatment is that of any other wound of the conjunctiva. The rapid healing obtained by this method prevents the dreaded result of a union of the palpebral with the ocular conjunctiva. The second method, which he employs where the burned surface is too large to allow of the employment of the first, consists in the use of animal grafts at the proper time, *i. e.*, at the beginning of the second period, not waiting for the third, as formerly advised.

At the request of the president, Dr. Sattler gave first a brief synopsis of Dr. Bryant's paper in French, and Dr. Redmont followed in Spanish.

Dr. SATTLER in opening the discussion (in English): "Dr. Bryant has presented a subject of great practical interest. My experience has not been so favorable with burns of the conjunctiva, with the exception of those cases which involve only the superficial layers. In others, in which the mucosa is destroyed, and in which sphacelation of the entire thickness and even the submucous, episcleral, and scleral tissues results, it has been rather uniformly unsatisfactory. This has been the case, even in spite of careful separation and the interposition of plates of rubber, ivory, transplantation of conjunctiva from mouth and from animals' eyes. Symblepharon in such cases would almost invariably result, which a subsequent operation would only relieve imperfectly and only by an extensive plastic operation or operations.

"I have never had any success with transplantation of conjunctiva either from other mucous surfaces of man or from the eyes of dogs or rabbits."

Dr. BRYANT: "I have tested this method and have found it superior and giving better results than other methods of treatment."

Dr. HENRY REDMONT, of Texas, considers symblephara difficult to avoid in burns of the conjunctiva when these are extensive. In a severe case of his he obtained a relatively satisfactory result, some mobility being restored to the eye, by means of an apparatus, made for him by a dentist, which he slipped between the upper eyelid and the eyeball, afterwards suturing the lids together. There was a good deal of swelling of the lids, but at the end of seven or eight days, when he withdrew his apparatus, he had destroyed most of the adhesions.

Dr. SANTOS FERNANDEZ, of Havana, said that he has observed that the most rebellious symblephara occurred after burns with lime. He recommends the insertion of an artificial eye of enamel or glass, whenever one desires to interpose anything between the lids and eyeball.

The CHAIRMAN opened the discussion on **Prolapse of iris after simple extraction: its etiology and treatment.**

Dr. SANTOS FERNANDEZ states that prolapse of iris, the inefficient cleansing of the anterior chamber, and secondary cataract are the three difficulties to be overcome in simple extraction, even with the help of antisepsis and local anæsthesia. He considers that, notwithstanding the fact that these points have been carefully studied by the authorities in ophthalmology, we are still far from having solved their difficulties. As far as he is concerned, he thinks that he has diminished the proportion of prolapse by the use of the diametral section, finishing this as far in the periphery as possible. He considers that this section, which is an approach to a median keratotomy, offers less difficulty for the removal of the lens, and prevents the prolapse. It does not, however, avert anterior synechiæ—slight because the prolapsed iris never occupies the whole length of the section, generally only its internal angle, and rarely does the adhesion extend beyond a single point.

Dr. VERTIZ, of Mexico, states that both he and his father have for a long time employed a large flap, without reaching the periphery, although without the knowledge that they were thus avoiding a prolapse of iris; the fact is that they have met with the same absence of prolapse as Dr. Santos Fernandez.

Dr. GALINDO, of Fulancingo, Hidalgo, says that although his experience is short, he has obtained similar results with the non-peripheric flap.

Dr. MONTAÑO, of Mexico, attributes the prolapse to repeated pressure with the spoon, which breaks up the small cells in the vitreous near the periphery which push the iris forwards; he advises that the pressure be uniform.

Dr. CHAVEZ drew the operation on the black-board, and tried to prove that a section perpendicular to the surface of the cornea predisposes more towards prolapse than an oblique one.

Dr. RAMOS, in summing up, recognized the difficulty of determining the cause of prolapse of iris, which may at times follow an uncomplicated operation, and not be met with after a difficult one, nor even after accidents during the healing. He next discusses the treatment, and considering the prolapse as a little dangerous symptom since the discovery of antisepsis, he thinks that one ought to wait for the adhesion of the iris to the wound margins to take place, and then to excise the prolapse.

Dr. Chavez favors immediate excision as a preventive of prolapse; when this occurs he attempts its reduction.

Dr. Chacon denies the efficacy of eserine; on the contrary he believes it favors the formation of secondary cataract.

Monday, November 16th, 3–5 P.M.

Dr. Ramos, Chairman.

Abstract of Dr. Sattler's paper on **Sarcoma of the orbit.**

Fourteen cases of malignant neoplasm of the orbit form the subject-matter of this contribution. Eight commenced as orbital growths and six took their origin from intra-ocular neoplasms. The conclusions emphasized from the observation of these cases are:

1st. That sarcomatous disease of this locality was inflexible in its course and almost uniformly fatal in its termination.

2d. That in exceptional cases only and when the growth is encapsulated early recognition of the nature of the disease, followed by immediate exenteration of the orbit may bring about its disappearance.

3d. Radical operative treatment is therefore justifiable in these most malignant of neoplasms, only during the early stage and if an exploratory operation discloses an enveloping capsule. In many cases it only seems to excite an increase of activity. It is positively unjustifiable and harmful if practised in the advanced stages of a rapidly growing tumor which has infiltrated the tissues and walls of the orbit.

The real origin here as elsewhere, remains obscure.

The most treacherous neoplasms were those of sub-periosteal origin. These were characterized by an almost incredibly rapid course and without exception resented surgical interference and manifested more malignant and more rapid activity after surgical interference.

More insidious so far as early manifestations are concerned but equally destructive and rapid during their later stages are gliosarcomata of the globe. Unless speedily recognized and as speedily removed by enucleation they burst through the tissues of the orbit, infiltrate the other structures of the orbit, etc., and inevitably terminate fatally.

Less rapid in their course but none the less fatal are those which originate in the bones of the skull and adjacent sinuses and by extension infiltrate the cavity.

No time of life was exempt. Childhood and during the early adult periods it was found more frequent.

Five of the cases of glio-sarcoma occurred in children, the sixth, a melano-sarcoma, in a woman aged 60.

In the last case the diagnosis of intraocular sarcoma was followed at once by enucleation. No tumor could be discovered in the orbit, but in five months the entire orbit was filled with a soft, inky looking sarcomatous mass.

In childhood and early life, an exceptionally rapid course was the invariable rule, an average duration of from three (3) to eight (8) months. During advanced life it was more protracted, extending in several cases over a period of several years.

Radical surgical treatment was practised in twelve out of fourteen cases and in every case without delay and in the most thorough manner.

The results bring up the cardinal question : Is radical surgery, exenteration of orbit, resection of bony walls, etc., in a case of rapidly growing sarcoma of the orbit, a justifiable measure? Should these cases be classed with the inoperable ones and receive only palliative treatment?

Certain it is that an exploratory operation can alone decide the advisability of radical operative measures. If this discloses a sub-periosteal neoplasm, a soft infiltrating growth of the connective tissues and globe or an extensive implication of the bony walls, if in addition the duration is brief and the growth rapid, surgery should only be resorted to with a full understanding of its hopelessness and uncertainty.

It should never be practised in a case of general sarcomatous disease in a child in which the orbital lesion is only the most conspicuous local expression of a simultaneous general infection, although enucleation is in most cases a recourse of beneficent expediency. All large and rapidly growing neoplasms of short duration, whether their origin be from the orbital tissues or walls or from an intraocular glio-sarcoma, must be classed among inoperable ones.

Such cases are only converted into more malignant recurrent growths and this is almost an unavoidable sequence of radical surgical treatment. Those most favorable for operation are the capsulated varieties of sarcoma. Unfortunately, however, this is rarely met with. An exploratory operation should in such a case be followed at once by speedy removal of the tumor, if possible, without rupture of its capsule. This, however, is not always possible because of the well-known secondary degeneration of these growths, their pulpy consistence, and owing to the fragility of the enveloping capsule. It should always be supplemented by complete exenteration of the orbit and even the use of the thermocautery. It should be the concern of the surgeon to make operative interference as thoroughly as possible in this, the only variety of malignant sarcoma in which a chance to save life is offered.

Discussion : Dr. SANTOS FERNANDEZ, referring to gliomata and sarcomata proceeding from the interior of the eyeball, says that in most of his cases a recurrence of the growth occurred, as he had seldom been able to operate while the tumor was still limited to the eyeball. When they have occupied the whole interior of this organ, not permitting a satisfactory ophthalmoscopic examination, he has found it very difficult to determine whether the case was one of simple detachment of the retina or of a malignant tumor.

Dr. CHAVEZ believes that in the detachment caused by an intraocular tumor, one finds a certain vascularization which is absent in that caused by other lesions, including cysticercus, of which he recently had a case.

Dr. RAMOS has made the same observation in a case which he saw in consultation with Dr. Chavez, and also attaches importance to the little mobility of the detached retina pointed out by Dr. Santos Fernandez.

Dr. SATTLER emphasized the conclusions referred to in the paper, and concluded by saying that sarcomatous disease commencing as a sub-periosteal growth is one of the most dangerous neoplasms found in the orbit, and that early adult life and childhood are the two periods of life during which it is most common. It is fortunately a rare disease. Equally dangerous are the gliosarcomatous growths which start as intra-ocular growths and soon become extra-ocular ones. They also grow with startling rapidity. Only one variety of sarcoma, and that is the encapsulated, offers a chance that surgery may afford relief ; all other varieties are hopeless and singularly fatal, more rapidly so with interference than without.

The CHAIRMAN opened the discussion on the **Etiology and treatment of secondary cataract.**

Dr. SANTOS FERNANDEZ referred to the general interest excited among oculists in making a perfect discission, and in the cleansing of the anterior chamber ; but it is a known fact that if there is no opacity of the anterior capsule we may have one of the posterior capsule. Discission is not in the opinion of all surgeons a simple operation, and if made a long time after the extraction, may produce amaurosis probably from glaucoma ; but if performed six or seven weeks after the extraction, as is the custom with Knapp, it is really innocent. He does not believe in the extraction of the cataract in its capsule ; he at least has given up all procedures which tend to this object.

Dr. VERTIZ describes a method of his own for the extraction of the lens in its capsule : he pierces the cataract with a needle with a thread attached to one end ; he pulls this and extracts the lens. He uses another special instrument which he leaves in the anterior chamber during the manipulations with the needle. He employs a triangular knife making a linear section.

Dr. SANTOS FERNANDEZ considers the method complicated and difficult to carry out ; it tends to create new instruments and to lengthen the operation, while he believes in their diminution.

Dr. RAMOS, discussing the question of secondary cataract, declares himself opposed to performing discission of the capsule with the Graefe knife whilst making the section in simple extraction ; he considers this dangerous, and believes that the discission is not large enough to allow the expulsion of all the soft cortical masses. He thinks that an extraction before the lens is totally opaque gives rise to secondary opacities, but that secondary cataract may occur, no matter what method be selected. He believes that the use of eserine after the extraction favors the formation of secondary cataract.

Dr. CHAVEZ says that to avoid secondary he operates only on mature cataracts ; that he cleanses the anterior chamber thoroughly, not by injections, which he disapproves of. He does not believe that the use of eserine has any influence in the production of secondary cataract. He repeats that he only operates on mature cataracts, but that the maturity is not always easy to determine.

Tuesday, November 17th, 9 A.M.–12 Noon.

Dr. RAMOS, Chairman.

Dr. HENRY REDMONT, of Corpus Christi, Tex., demonstrated several **Microscopic preparations of tumors** and other pathological lesions, which excited much interest on the part of the members.

Dr. SANTOS FERNANDEZ read a paper :—**Study of some palpebral autoplasties.** He described fourteen plastic operations performed with the object of restoring either the upper, or the lower lid. Of the three general methods, by sliding, proximal, or by distant flaps from the same or another person (Indian method), he prefers the two first, so far as blepharoplasties are concerned. He admits the advantages of the first, but recognizes at the same time the multiple applications of the second. He considers skin grafts as reserved for very special cases. In order to obtain a satisfactory result, it is indispensable to secure perfect freedom of the margin of the affected lid, and to unite the lid borders before adapting the flap. He favors blepharoplasty in two parts : in the first he frees the adhesions which bind the ectropionized or contracted eyelid, and closes the palpebral fissure ; after a few days the flap is applied to the defect produced. As regards the flap, he disregards the indications given in the text-books, of such or such a method to be followed as a general rule, as he considers that the site from which it is taken and its shape must depend on the lesion, and even on the shape of the patient's face. He only recommends a fronto-nasal flap (recognized as the best on account of the greater vascularity of the region) for certain contractions or for ectropion of the internal portion of the lower lid, because any contraction will be upwards and tend to raise the lower lid. He thinks that blepharoplasties are seldom entirely satisfactory from an æsthetic point of view, but the main object is to preserve the eye and avoid the loss of sight.

Dr. URIBE read a paper on **A case of blepharoplasty with application of Thiersch's flaps.**

The session was adjourned.

Tuesday, November 17th, 3–5 P.M.

Dr. RAMOS, Chairman.

Discussion of the papers read in the morning session : Dr. SATTLER in English : "I have been much interested in Dr. Santos Fernandez's second paper on plastic operations, and especially in his method and the results of his surgical methods. The plan of dividing the operation in all extensive cicatricial deformities of the lids into two parts, the first having for its object the division of the cicatricial contractions and uniting of the lid borders, and the second concerned with bringing about a satisfactory covering of the lid by sliding or twisted flaps or detached flaps from the arm, after the methods of Wolfe and Thiersch, is the one which I follow. This plan is also practised by many surgeons in the United States."

Dr. CHAVEZ considered the blepharoplasties performed in Mexico and the case of Dr. Uribe, in which he assisted. He states that it is seldom performed in his country, because more is demanded from it than one ought to expect. Rarely or never is there much æsthetic gain, but that the protection afforded to the eye not only saves much suffering, but enables one to save sight or what remains of it.

The CHAIRMAN proposed opening a discussion on **The manner of making uniform the numbering, the notation, and the prescription of spherical and cylindrical lenses employed in the correction of ametropia, for the whole American continent.** Drs. CHAVEZ, PREFONTAINE, and BRYANT were commissioned to draw up a report.

Wednesday, November 18th, 9 A.M.–12 Noon.

Dr. RAMOS, Chairman.

A paper by Dr. FRANK S. MILBURY, of Brooklyn, N. Y., **Insufficiencies of the muscles of the eye,** was read at the suggestion of the chairman, Dr. Milbury being absent. He attributes headaches and fatigue on the part of the eyes to heterophoria, deviations of the eyes being only appreciated when they reach the degree of squint. He advises, where heterophoria is suspected, an examination of the eyes to be made with regard to astigmatism; this excluded, or if, when present and corrected, no relief be obtained of the asthenopic symptoms, one ought to look for some insufficiency; if present and if it do not yield to the use of corrective glasses one falls back on a tenotomy of the affected (?) muscle.

Discussion: Dr. CHACON says that it is at times difficult to discover heterophoria, and more so to determine its degree; that he only tenotomizes when other simpler remedies have proved unavailing, viz.: correction of the ametropia, if present; ocular hygiene commencing by giving rest to the tired organ. He says that in the United States great importance is given to the work of Dr. Stevens.

Dr. Prefontaine believes that the study of heterophoria is not complete and that authorities in ophthalmology have met failures in their operations.

Dr. Chavez describes a **New method for enucleation of the eyeball,** in which he makes use of scissors invented by himself. These are curved on their edge, one branch which is probe-pointed is several millimetres longer than the other. He makes a small opening in the conjunctiva close to the cornea, introduces the probe-pointed branch and divides the conjunctiva all around and close to the cornea ; he next introduces the same branch under each of the tendons of the recti, cutting them—dividing all the adhesions with another pair of curved scissors ; he then introduces his index finger till he touches the optic nerve, which serves as a guide for the scissors which are to divide it ; he finally divides the obliqui. Later he enucleated an eye in the hospital according to this method, receiving the praise of those present.

Discussion in English and French. Paper read in Spanish and English.

Dr. Sattler : "I have always practised the old Bonnet method and I can readily see the advantage of the one new pair of scissors with the curved blunt point and which serves the double purpose of hook and cutting instrument. The only objection I see is the difficulty of guiding and manipulating the hook and scissors with the thumb and fingers. We have had various devices of narrow blunt-pointed scissors."

Wednesday, November 18th, 3–5 P.M.

Dr. Santos Fernandez, Chairman.

A voluminous paper of Dr. Teofilo A. Moret, of Buenos Ayres, Argentine Republic, on **Statistics and clinical notes of the Ophthalmological Department of the Hospital of Clinics,** read by title.

Dr. Montaño makes some observations on **The difficulties in keratoscopic diagnosis occasioned by muscular contraction,** and explains by means of formulæ on the black-board the cause of these difficulties.

Discussion : Dr. Chavez recommends the use of atropine in order to avoid them.

Thursday, November 19th, 9 A.M.–12 Noon.

Dr. Sattler, Chairman.

Dr. Alonso, of Mexico, reports an interesting case of **Intra-orbital tumor.** The patient was a middle-aged man, who, without great discomfort on his part, noticed a gradual pushing downward of one of his eyes by a tumor of the superior wall of the orbit ; there was scarcely any suffering ; the upper lid was swollen and œdematous. An exploratory incision having been made, Dr. Alonso found a cyst of about the size of a hen's egg ; having collected the contents, these were examined bacteriologically and found to contain pyogenic germs. After the emptying of the cyst the eye returned to its proper place, but from that moment there was pulsation in the region of the orbit—it proceeded from the cranial contents. A tactile examination made manifest the fact that at the site of the cyst there was a defect in the bony wall of the orbit, the cerebrum being exposed. Under an appropriate treatment the patient continued well, though recovery was not yet complete. Vision had only been slightly affected, due to the stretching of the optic nerve. The ophthalmoscope showed no lesion of the fundus.

Discussion : Drs. Ramos and Santos Fernandez after interrogating Dr. Alonso, on several points, agree in considering the case as most interesting and rare. They cannot explain how a simple cyst, which has scarcely given rise to any discomfort and only caused a little palpebral œdema, could have affected the bony wall to such a degree.

Dr. Santos Fernandez read a paper on **Treatment of trachoma by subconjunctival injections of permanganate of potassium in the fornix.** In view of the rebellious character of the countless cases of trachoma treated daily in the eye-clinics, the author adds a new method of treatment for this obstinate affection. As the treatment in general use is that by cauterizations, especially in old patients, for other methods, such as excision of *cul-de-sac*, *brossage*, and expression, to be well carried out, necessitate general anæsthesia, he thought of subconjunctival injections of permanganate of potassium into the oculo-palpebral cul-de-sac. He bases his treatment on the fact that the region of the fornix is the most rich in glands and tissues appropriate for keeping up the granulations, and with them the undiscovered germ of the disease resides. If this region be infiltrated by an antiseptic liquid, such as permanganate of potassium, the cause is directly attacked and the relief or cure should be more rapid and effective than by other methods. The greatest obstacle was the pain produced by these injections, but this was overcome by preceding the permanganate injection by one of cocaine (1 per cent. solution). Although the number of cases treated are not numerous enough to exclude all doubt as to the efficacy of the treatment of one of the most rebellious of eye diseases, it is large enough to prove that they are exempt from danger, and one can logically understand that their action must be beneficial in all cases even if not absolutely curative.

Discussion : Dr. MONTAÑO has listened with interest to the treatment proposed by Dr. Santos Fernandez, for a disease against which so many methods have been recommended, without even the most modern (brossage included) being able to make sure a perfect cure. He thinks, and the author does not hide the fact, that the number of cases is not sufficient to enable any judgment to be passed on the treatment recommended, but that it is evidently innocuous and that in Mexico there will be plenty of occasion to try it, for although there is not more trachoma than elsewhere, there are enough cases of this disease. Trachoma is frequent enough here (Mexico), notwithstanding that he does not recognize as such the affection which for some time back has been designated by Dr. Carmona y Valle as "exuberant conjunctivitis," by Dr. Ramos as "oxide of iron conjunctivitis," and which later Dr. Chacon has associated with the spring catarrh of Europe, and which other authors consider as simply a scrofulous manifestation. Dr. Montaño recommends in the treatment of pannus applications of iodine in vaseline (1 per cent.).

Dr. URIBE agrees with Dr. Montaño in the advisability of trying the permanganate injections in the treatment of trachoma ; but that he considers his statement that trachoma is frequent in the city of Mexico as an error. It is on the contrary rare, as can be vouched by the other specialists who practise there.

Dr. RAMOS supports Dr. Uribe's statements, and believes that if at some former time more cases of trachoma were reported it was due to the considering as such of the "exuberant conjunctivitis" of Carmona y Valle, called formerly by Dr. Vertiz, Sen., "conjunctivitis agavica," believing it to be produced by the plant called "maguey," in the localities where this is cultivated for the manufacture of "pulque." He adds that at the last International

Congress at Berlin, in the discussion of the geography of trachoma, he had stated, as also proved in a paper which he published at the time, that in the city of Mexico, on account of its 2600 metres above the sea-level, trachoma was infrequent.

Dr. CHACON has computed the statistics of the "Hospital de San Andres," and in 14,000 eye patients scarcely 200 cases of trachoma are recorded. He gives importance to the height above the sea-level and to the race-factor in the production of trachoma.

Dr. RAMOS only gives importance to the elevation, for in Mexico one meets several races; and the patients which he has seen are either Spaniards or residents of localities distant from the tableland on which Mexico city is situated.

Dr. GALINDO says that when he practised in a locality of the Republic near the coast, in a short time he saw a number of cases of trachoma, whilst since he has practised in a place the height of which above the sea-level is approximately that of Mexico, he has scarcely met any cases.

Dr. BRYANT, who lives in the Rocky Mountains in the United States, scarcely has seen any cases. He thinks that the permanganate injections should be tried.

Dr. SANTOS FERNANDEZ expresses his opinion that nowhere better than in Mexico can the influence of height above the sea-level on trachoma be demonstrated, for Mexico is a city with a European "cachet," where there exists a higher class, the possessors of refined taste, culture, and of the attributes of opulence; and that at the same time nowhere else does one meet with a lower class belonging mostly to the indigenous race, extremely indolent and careless by nature, notwithstanding the numerous efforts directed towards improving their condition,—and as is well known this social class is the best soil for trachoma.

Dr. REDMONT discusses the cases of granular conjunctivitis observed in the town of Berlin, due to the laborious life and crude climate. He recommends electricity in the treatment of trachoma.

Dr. SATTLER calls attention to the care which should be taken in the differentiation of granular from follicular conjunctivitis.

Dr. RAMOS reads a **Short study of astigmatism in Mexico.** It is generally admitted that astigmatism, be it simple or compound, myopic or hypermetropic or even mixed, is *according to the rule* when the vertical meridian is the most refracting. Thus expressed he regards the idea of astigmatism according to the rule as erroneous. Theoretical considerations on the human eye on the one hand, and observations in practice on the other, lead him, according to his humble criterion, to alter the classical acceptation. He has given expression to some of his ideas on the subject before the National Academy of Medicine of Mexico. A careful statistical record kept in his private practice and at the Ophthalmological Clinic of the National School of Medicine authorizes him to modify in part the general designation as follows : 1. An astigmatism is *according to the rule* when the vertical meridian (rare occurrence), or some other which is nearer this than the horizontal (more common), is the most refracting. 2. An astigmatism is *against the rule* when the horizontal meridian (rare case), or some other which is nearer it than the vertical (common case), is the most refracting. 3. It is not rare to find cases where the most and least refracting meridians are inclined 45° to the vertical and horizontal. It being impossible to analyze the figures on which these ideas are based in an extract which cannot contain over three hundred words, he will try to prove with facts his assertions, making clear the frequency of anisometropic (?) astigmatism, be it myopic or hypermetropic.

Discussion : Dr. CHAVEZ observes that he has found a variety of astigmatism called by Roux, " bi-oblique astigmatism."

Drs. PREFONTAINE, BRYANT, and CHAVEZ read the following conclusions, which are discussed and accepted, on the **Best means of making uniform the numeration, notation, and prescription of spherical and cylindrical lenses** used in the correction of ametropia, for the whole American continent : 1. The numeration of the lenses shall always be according to the decimal metric system, *i. e.*, in dioptries. 2. In fixing the axis of cylinders the 0° should be placed to the patient's left, and the glass must be considered as seen from behind. 3. Constructors of combined glasses should be advised to always place the cylinder behind the spherical lens. 4. The prescription should be written thus : (*a*) For the spherical glass, one must first note with the letters R E or L E the eye to be corrected, next with the sign + or − the convexity or concavity of the glass, then the letter S and the number of dioptries, followed by the letter D ; formula : L E ± S N D. (*b*) For simple cylindrical glasses—the formula of the eye and lens, followed by the abbreviation **ax** and the number of degrees which indicates the inclination of the axis ;

formula : L E ± C N D ax g°. (*c*) For combined glasses, one must first put the formula of the spherical glass, then the sign ⊂⊃, and finally the formula of the cylinder : L E ± S N D ⊂⊃ ± C N D ax g°.

Dr. Vertiz refers again to his method of extraction of cataract in its capsule (expressing himself in English).

Dr. Sattler (English): " I have been much interested in Dr. Vertiz's novel and ingenious method of cataract extraction. It necessitates, however, a complicated technique and inflicts greater traumatism than the methods ordinarily practised by ophthalmic surgeons entail. This objection, I fear, would prevent its adoption as a substitute even, in certain favorable cases, for other operative procedures at present in favor and upheld by general experience."

After this the meeting adjourned, and farewell remarks were made by the President Dr. Ramos, Dr. Santos Fernandez, and Dr. Chavez.

The President, Dr. Ramos, asked Dr. Sattler to close the session.

Dr. Sattler, in accepting the honor conferred, said briefly in French :

" To you, Mr. President, and our Mexican and Spanish-American friends, I must express, in the name of my colleagues, our appreciation for the numerous courtesies extended to us. Certainly we have been the recipients of much kindness and uniform attention, and we shall carry with us only the most pleasant and profitable impression of our stay in the city of Mexico.

" So far as the meetings of this section of the Congress are concerned, they assuredly reflect the painstaking labors of our esteemed President, Dr. Ramos, and his colleagues, Drs. Chavez, Montaño, and Chacon. To his and their personal exertions the success of the Ophthalmological Section, with its interesting discussions, must mainly be ascribed.

" Let us all join in the wish that we may meet at the next Congress in Caracas, Venezuela ; and once more permit me to express my appreciation for all the kindness and courtesy extended to us during this pleasant and profitable visit in your city."

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE SECOND QUARTER OF THE YEAR 1896.

By Dr. ST. BERNHEIMER, in Vienna; Prof. C. HORSTMANN, in Berlin; and Dr. P. SILEX, in Berlin;

WITH THE ASSISTANCE OF

Dr. S. M. Burnett, Washington; Dr. Dantone, Rome; Dr. Herrnheiser, Prague; Prof. Hirschmann, Charkow; Dr. P. von Mittelstädt, Metz; Dr. Sulzer, Geneva; Dr. L. Werner, Dublin; Dr. C. H. A. Westhoff, Amsterdam; Dr. Schiötz and Dr. Ole Bull, Christiania; Dr. R. Greeff, Berlin; Dr. Deus, Berlin; and others.

Translated by Dr. Ward A. Holden.

Sections I.–V. Reviewed by Dr. ST. BERNHEIMER.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS. STATISTICAL REPORTS.

184. Guaita. Dr. Giovanni Rosmini, *Annal. di Ottalm.*, xxv., 2–3, p. 316.

185. Albertotti. Researches in the history of spectacles. *Accad. di Scienze, Lettere et Arti di Modena.* June 3, 1896.

186. Schenkl. Report on the out-patient eye service of the policlinic of the German University in Prague for 1894. *Prag. Med. Wochenschr.*, 1896, No. 4.

187. Steiner. Report of 3104 cases of eye disease in Malays. *Geneeskundig Tijdschrift von Nederlandsch-Indie*, xxxvi., p. 32.

188. SCHLEICH. The visual power of the higher animals. Introductory address on accepting the professorship of ophthalmology in the Tübingen high school, February 6, 1896.

GUAITA (184) has written a memorial of the ophthalmologist Rosmini, deceased in March, 1896, who was the founder and director of the Milan ophthalmic institute and one of the first of Quaglino's scholars.

ALBERTOTTI (185) says that the statements of Mercurialis and Redi to the effect that Gordonius mentioned spectacles in his works are now confirmed by comparing the passages cited in five different codices of this author. Albertotti, however, cites a passage in the works of Guy de Couliac found in Venetian incunabula and in a palimpsest of the 14th century, from which it appears that Guy de Couliac really saw spectacles and described them.

SCHENKL (186) treated 4140 eye patients in the Prague University clinic in 1894. Conjunctivitis made up 2094 cases, with follicular conjunctivitis 1002. Besides these there were 12 cases of glaucoma, 50 of cataract, 303 of refraction anomalies, and 93 of accommodation anomalies. HERRNHEISER.

According to STEINER (187) thirty per cent. of his cases are trachoma and its sequelæ. Lachrymal-sac diseases are rare among the Javanese.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

189. BASEVI. A contribution to the study of the thermometry and stethoscopy of the eye. *Annal. di Ottalm.*, xxv., 2–3, p. 269.

190. SEGAL. On the haloes seen by healthy and diseased eyes. *Wjest. Ophth.*, 1896, 3.

191. VAN DUYSE and DE BERSAQUES. A congenital sacrococcygeal tumor with a rudimentary ocular vesicle. *Ann. de la Soc. belge de Chirurgie*, 6–15, Oct., 1895.

192. MÜLLER RÉE. Visual tests with a luminous point. p. 147, *Med. LXI.*, *Faaler*, *Det Nordiske Forlag.*, Copenhagen, 1896.

193. SILEX. Pathognomic signs of congenital syphilis. *Berl. klin. Wochenschr.*, 1896, 7.

194. v. REUSS. On the electric treatment of ocular inflammations, *Wiener klin. Wochenschr.*, 1896, 20, p. 393.

195. SALZER. Experimental investigations on spontaneous perforation of the sclero-corneal margin after the introduction of aseptic materials into the anterior chamber. *Graefe's Archiv.*, xl., 2, pp. 55–79

196. BACH. An anatomical contribution to the genesis of congenital coloboma of the eyeball. *Arch. f. Augenheilk.*, xxxii., 4, p. 277.

197. SIMON RICHARD. On a disagreement between the results of the stereoscopic tests and of Hering's test with the falling balls. *Centralbl. f. prakt. Augenheilk.*, xx., June.

198. BAAS, K. The semiotic meaning of pupillary disturbances. *Samml. zwangloser Abhandlungen a. d. Gebiete der Augenheilk.*, vol. i., part 3. Halle, 1896.

199. WEEKS. Lipoma of the interior of the eye. *N. Y. Eye and Ear Infirmary Reports.* Jan., 1896.

BASEVI'S (189) measurements of the temperature of the eye show that the action of light, massage, and inflammation cause an increase in temperature. In a case of dacryoadenitis the temperature rose to 39.2°. Atropine, eserine, and some other drugs raise the temperature, while cocaine lowers it. Auscultation of the eye permits the sound of the recti muscles to be differentiated from that of the obliqui. DANTONE.

In a tumor of the coccyx removed from a patient aged three years, VAN DUYSE and DE BERSAQUES (191) found a monolocular cyst lined with pigmented pavement epithelium. The cells were hexagonal like those of the proximal layer of the retina. It probably represented a rudimentary primary optic vesicle without a trace of invagination. Similar cysts have been seen by Kümmel (coccygeal tumor), Baumgarten (ovarian tumor), Verneuil and Guersant (tumor of the testicle). SULZER.

MÜLLER RÉE (192) has made a number of experiments with a luminous point for the purpose of determining whether in this way anything definite can be elicited in regard to errors of refraction. The patient's eye, before which is a lens of 3 D, is placed at distances varying from 1 *cm* to 1 *m* from a point of light, and the patient is required to draw the image of the light as it appears to him at the different distances.

Regularly astigmatic eyes are rare. Usually there are irregularities which the author classes under two heads: (*a*) cases in which planes passing through the pupil and being parallel to one of the principal meridians are more strongly refracting at one end than at the other, and (*b*) cases in which similar parallel planes are of different refractive strength. There are also eyes whose optic systems form a curved focal line as the image of a luminous point. This method facilitates the discovery of optical anomalies which are not easily made out by other clinical methods, and which being overlooked, an erroneous diagnosis of amblyopia is made. The greatest acuteness of vision found by the author was 6/4 Snellen, which often existed in eyes with regular optical systems, but was once present in an eye which had a very irregular optical system. The determination of astigmatism by means of a luminous point seems to be the most accurate method both for the discovery of the astigmatism and for its measurement.

SCHIÖTZ.

In WEEKS'S (199) case the interior of an eye 18 *mm* in its equatorial diameter, which has been diagnosticated as congenital staphyloma of the cornea, was found to be filled with a mass of pure lipomatous tissue. The corneal layers were all present, but the layer of Bowman was supplanted by a thick pannus substance and the endothelial layer was absent in places. There was no lens. The probabilities seem to be that there was primarily an ulceration of the cornea which healed after the escape of the lens with subsequent development of the fatty tissue.

BURNETT.

III.—INSTRUMENTS AND REMEDIES.

200. DE VINCENTIIS. On the so-called new method of making an artificial pupil by means of iritomy "à ciel ouvert." *Lavori della clinica oculista d. R. Univer. de Napoli*, iv., 3, p. 260.

201. UHTHOFF. A contribution to keratoscopy. A new keratoscope. *Zehender's klin. Monatsbl.*, xxxiv., p. 219.

202. BULL, GEORGE. Subjective optometry. *Arch. d'opht.*, xvi., 4, p. 219.

203. MORTON, R. A. Case of hyoscine poisoning following instillation. *Brit. Med. Journ.*, 1896, p. 336.

204. ROGERS, F. T. Acute glaucoma in both eyes following the instillation of homatropine. *Ophth. Record*, May, 1896.

205. BATES, W. H. The use of extract of supra-renal capsule in the eye. *N. Y. Med. Journ.*, May 16, 1896.

206. Mayo, Florence. The comparative values of homatropine and atropine as mydriatics. *Med. News*, Jan. 27, 1896.

207. Burnett, S. M. The use of formalin in ophthalmic practice. *Ophth. Record*, March, 1896.

208. Jackson, E. The mirror for skiascopy. *Amer. Journ. of Ophth.*, April, 1896.

De Vincentiis (200) explains that the new method of forming an artificial pupil described by La Grange under the name *iritomie à ciel ouvert*, is new in nothing but the name. He himself described this operation in 1886 as *iritomia ab externa*. Schöler in 1886 also described the same operation, calling it extraocular and, later, precorneal iridotomy. Dantone.

In the subjective determination of refraction, Bull (202) corrects with the star figure the meridian of least curvature, using the weakest possible concave glass in myopic and the strongest convex glass in hyperopic and mixed astigmatism. Then concave cylinders are added until the astigmatism is corrected. The cylinder is then left in place and other spherical glasses are added until the refractive error is corrected. The author uses two black lines crossing at a right angle on a rotating disc, the lines being placed in the directions of the principal meridians, as revealed by the star figure. Since one only needs to see two lines sharply, the examination with spherical glasses is rendered easier. v. Mittelstädt.

Morton's (203) patient, a woman aged fifty, suffered from irido-cyclitis, for which 6 drops of 1 % sol. of atropine were instilled thrice daily with little effect on the pupil, and only caused slight dryness of the throat. A fresh 1 % sol. of hyoscine was made and 2 drops were put into each eye. Five minutes after she complained of giddiness, great dryness of the throat, and staggered. She then became unconscious for four hours, face flushed, pulse full regular; this was succeeded by a period of semi-consciousness and delirium. She recovered after a good sleep. Werner.

Rogers' (204) patient was a woman forty-one years old, on whom he had used $\frac{1}{50}$ gr. homat. hydrobrom. and cocaine mur. $\frac{1}{50}$ for testing refraction. Two days later there was a localized œdema of the conj. of the left eye, but no increase of tension. On the next day there was a full-blown glaucoma in the left and commencing in the right. Iridectomy in both, with vision of R 0.2, L 0.6. Burnett.

Bates (205) has been making experiments in the use of extract of the supra-renal capsule of the sheep, and he gives a preliminary report of its effect on the eye. Its most marked effect when dropped in the eye is to constringe the blood-vessels and render the subconjunctiva anemic. He has found it to do so in all inflammatory conditions of the anterior portion of the eyeball. The effect lasts for about an hour. It acts promptly as a hæmostatic in operations on the conjunctiva. Its use is not painful, and there are no toxic effects. Burnett.

After a comparative trial of homatropine and atropine as paralyzers of the accommodation, Mayo (206) concludes that atropine fails to reveal any error of refraction which homatropine had not already uncovered. Homatropine was used, 1 gr. to 40 minims of water, one drop every five minutes for an hour before testing.

Burnett.

Burnett (207) has used a solution of formalin with excellent effect in muco-purulent conjunctiva and "pink eye," also in ulceration of the cornea, touching the ulcer with a 1. to 60 solution once a day and using 1 to 2000 as a wash every four hours. He thinks the great penetrating power of the drug its chief advantage over other anti-microbic remedies.

Jackson (208) recommends that a mirror for skiascopy should have a small eye hole not above 2 *mm* in diameter. As to the size of the mirror itself he commends one 38 *mm* in diameter, which can, for certain purposes, be advantageously reduced to 10 *mm* by having a cover with an opening of this size that can be slipped over it. Burnett.

IV.—ANATOMY.

209. Passera. The vascular network of the chorio-capillaris in man. *Studies from the laboratory of normal anatomy of the Royal University of Rome*, v., 2.

210. Collins, E. T. The glands of the ciliary body : a reply to some recent criticisms concerning them. *Ophth. Review*, xv., p. 67.

Passera (209) describes in detail the finer relations of the capillary network of the choroid, illustrating them with twelve fine colored drawings of injected specimens. As new observations he states that the meshes of the network gradually decrease in size toward the posterior pole of the eye and are narrowest at the macula; further, the terminal branches which, according to Leber, run perpendicular to the plane of the membrane, really do so only near the macula, but toward the ora serrata they have an oblique course. DANTONE.

Collins (210), when speaking of glands, states that he does not refer to the recesses between the ciliary processes but to definite outgrowths of cells from the pigment epithelium only. The fact that Alt could not find a lumen between the cells is probably due to the fact that he did not examine bleached transverse sections. The posterior groups of glands are not, he thinks, due to folding of the epithelium. He does not deny that the aqueous is secreted by the surface as well as by the glands of the ciliary region. Proliferation of the pigment epithelium of the choroid, ciliary body, and iris occurs under similar circumstances, but it is only in the ciliary region that tubular processes come to be formed. The number of cases of primary glandular or carcinomatous-like new growths of the ciliary body is increasing. WERNER.

V.—PHYSIOLOGY.

211. OSIO. Diffusion circles. *Ann. di Ottalm.*, xxv., 2–3, p. 123.

212. MAGNANI. Monocular vision and painting. *Arch. di Ottalm.*, iii., 11–12, p. 333.

213. THOMAS. On the association fibres of the oculo-motor nuclei. *Ann. d'ocul.*, cxv., p. 293.

214. KATZ. On the minimum of illumination possible for work. *Wratsch*, 1896, 18–20.

215. HESS. Studies in accommodation. II. On the partial contraction of the ciliary muscle correcting lenticular astigmatism. *Graefe's Archiv*, xlii., p. 80.

216. ALLEN, S. B. Asthenopia due to glare. *Manhattan Eye and Ear Hospital Reports*, Jan., 1896.

217. DENNETT, WM. S. Shaded glasses. *N. Y. Eye and Ear Hospital Reports*, Jan., 1896.

218. CHASE, W. E. An instrument for the study of color scotomata. *Ibid.*

OSIO's (211) comprehensive paper treats of: 1. The laws according to which diffusion circles arise, with a critical review of the various methods of observation. 2. The computation of the different diameters of the circles in different eyes and with different states of refraction and accommodation. 3. The disturbance of vision produced by diffusion circles. 4. The practical and mathematical proof of the difference in result between actual observation and computation. 5. The objective proof, by means of photography, of the laws and peculiarities of diffusion circles.

MAGNANI (212) has examined seventeen pictures by Guercino, who squinted with his right eye, in order to find whether the pictures show faults which might be attributed to his monocular vision. The author believes that he has discovered faults in drawing and in coloring which, however, are rather to be attributed to the negligence of a rapid painter. As regards conception of perspective, use of foreshortening and handling of chiaroscuro for the purpose of producing the effect of relief, Guercino had been too thoroughly instructed by the Caracci in Bologna, to go wrong even with his defective vision. In conclusion, the author mentions the fact, that there is at present a scholar in the Turin academy whose drawings are so excellent in every respect that his professors consider him easily the best scholar in the school, they being unaware that he has only monocular vision, one eye being aphakic. DANTONE.

In experiments on the cerebellum and its peduncles, THOMAS (213) twice accomplished the destruction of the abducens nucleus, once in a rabbit and once in a guinea-pig. Both animals lived long enough to permit secondary degeneration to take place. The nucleus of the abducens and its fibres of association could thus be studied in serial sections.

Matthias Duval and Laborde have supposed that the commissural fibres between the abducens nucleus and the oculo-motor nucleus of the opposite side run in the posterior longitudinal bundle, and pass the median line at the point where they enter the oculo-motor nucleus of the opposite side. Thomas found degenerated fibres in the posterior longitudinal bundle of the side opposite the lesion. This fact proves that the crossing of the association fibres takes place at a point lying deeper than Matthias Duval and Laborde supposed. SULZER.

A minimum working illumination of ten-metre candles as proposed by Cohn, seems to KATZ (214) to be a purely arbitrary selection. The curves made by Uhthoff and Karvetzky show a marked increase in acuteness of vision when illumination is increased, but only a slight increase in ability to read continuously.

A series of experiments gave the author an illumination of four meter-candles as usually sufficient for reading without fatigue. With this illumination one obtains 0.7 of the maximum ability to read by daylight. HIRSCHMANN.

HESS (215) denies the existence of partial contraction of the ciliary muscle on the ground of detailed experiments of his own, and the reports of other observers. In the examination of astigmatic individuals, many sources of error have been disregarded. Thus, for example, the ability to read a certain text is taken to indicate an accurate focussing of the eye for this, although in certain circumstances reading is possible even when large diffusion circles exist. The neglecting of the play of the pupil and the varying width of the palpebral fissure has also led to error.

Hess has also sought to show, by experiments on a number of astigmatic patients, that the accepted view that astigmatic patients must focus on a focal line is wrong, and that for best vision the eye is adjusted to a focal circle.

ALLEN (206) relates some cases in which the asthenopic symptoms seemed to be due to excessive brightness of light, and not to refractive troubles. BURNETT.

DENNETT (217) describes a method of obtaining with accuracy any desired intensity for shaded glasses, according to Fechner's formula. He makes ten grades from white paper to printers' ink, and the shade can be obtained by a Maxwell's disk or top extemporized by marking with ink circles or sectors on a visiting card. BURNETT.

CHASE'S (218) method of taking the scotoma for a color is to spread a sheet of paper of the color for which there is a scotoma over a sheet marked in concentric circles and sectors like a perimeter chart. The size of the scotoma is found by advancing a small bit of white paper from the periphery until it reaches the edge of the scotoma in all directions, the markings of these points giving the outline of the scotoma, and when the part embraced in this is torn away, the size of the scotoma in degrees is seen on the chart beneath. BURNETT.

Sections VI.–XI. Reviewed by Prof. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

219. FUKALA. The cure of myopia of high degree. p. 192, *Deuticke.* Leipsic and Vienna, 1896.

220. SILVESTRI. The surgical treatment of myopia. *Sett. med. dello Sperimentale*, iv., 20–22.

221. ADELHEIM. A case of extraction of both lenses in progressive myopia. *Wjest. Ophth.*, xiii., 3, p. 213.

222. ASCHER. On the operative treatment of myopia of high degree. *Beitr. z. Augenheilk.*, xxiii., p. 21.

223. SCHÖN. The refraction of myopic eyes before and after extraction of the lens. *Arch. d'opht.*, xvi., 6, p. 344.

224. APPENZELLER. Transient myopia in diabetes mellitus. *Centralbl. f. prakt. Augenheilk.*, 1896, p. 139.

225. ROURE. On bi-oblique astigmatism and its correction. *Arch. d'opht.*, xvi., 4, p. 24.

In the first part of his book FUKALA (219) gives the results of all the published cases of extraction in myopia, and in the second the computation of the optic constants, the axial length of the eye and the size of the images.

SILVESTRI (220) has removed the lens in thirteen cases by discission and subsequent extraction with good results.

DANTONE.

SCHÖN (223) states that the myopic eye, on account of the increased length of its axis, must lose more in refraction by removal of the lens than the emmetropic eye, but that in consequence of the backward displacement of the lens in the myopic eye the loss in refraction is somewhat lessened. v. MITTELSTÄDT.

ROURE (225) designates by the expression "bi-oblique astigmatism" that form in which the principal meridians are not perpendicular to each other. This astigmatism is not irregular and may be corrected by cylindrical glasses with axes not at a right angle, as the author shows by reports of two cases. The axes of the principal meridians were determined by Javal's ophthalmometer. v. MITTELSTÄDT.

VII.—LIDS.

226. REINER. A case of syphilitic tarsitis with fungoid infiltration of the bulbar conjunctiva. *Beitr. z. Augenh.*, xxiii., p. 57.

227. SILVESTRI. On the etiology and treatment of trichiasis. *Settim. med. d. Sperimentale*, l., No. 5.

228. Pechin. Considerations on the operative treatment of cicatricial entropium by two new procedures. *Arch. d. opht.*, xvi., 5, p. 291.

229. v. Siklosy. The results of two plastic operations for epithelioma of the lids and face. *Zehender's klin. Monatsbl. f. Augenh.*, xxxiv., p. 183.

230. Franke. On the use of Thiersch grafts in ophthalmology. *Centralbl. f. prakt. Augenh.*, 1896, p. 170.

231. Scott, K. Two cases of symblepharon, with remarks on some native Egyptian methods of eye treatment. *Oph. Rev.*, xv., p. 75.

232. Keber, J. B. Gummata of the eyelids. *Amer. Jour. of Ophth.*, May, 1896.

233. Alt. A case of rhabdo-myoma of the eyelid. *Ibid.*, April, 1896.

234. Lambert, W. E. Epithelioma originating in Meibomian gland. *N. Y. Eye and Ear Infirmary Reports*, January, 1896.

In a patient with syphilis, aged thirty, Reiner (226) saw a swelling gradually develop in the right upper lid. Palpation showed it to be connected with the tarsus, and it could be felt through the skin as a large body of cartilaginous hardness. Its yellowish color could be seen through the conjunctiva. The skin over the tumor was hyperæmic but movable and the conjunctiva of the lid and ball was red and granular. The condition improved after inunction treatment.

Silvestri (227) speaks of the development of trichiasis and entropium, particularly after trachoma. To correct the condition he employs Crampton's procedure with some modifications. The two vertical incisions ½ *cm* long are made as far apart as possible. After eversion of the lid the conjunctiva and tarsus are cut through parallel to the lid margin and near the mouths of the Meibomian glands. After incising the outer skin and freeing the orbicularis muscle, a narrow strip of skin is removed, if the skin is abundant, and the wound immediately closed with sutures. This must be so done that between the two margins of the skin wound the upper margin of the tarsus is included in the suture. The edges of the vertical incisions are united by two oblique sutures. The author states that he has done this operation 114 times without seeing a relapse. Dantone.

Pechin (228) speaks of the disadvantages of the customary entropium operations and compares them with the methods of Lagleyze and Panas. He replies to the objections urged by Lagleyze against Panas's operation, viz., the great pain, the severe hemorrhage, the difficult technique, the unpleasant resulting scar, and the uncertainty of the result. He believes that the subject of entropium operation is exhausted and that nothing more can be done than to make slight modifications of the methods already known. v. Mittelstädt.

In Siklosy's (229) patient, a woman of eighteen, an epithelioma involved the outer half of the upper lid, the entire lower lid and the skin of the face. The conjunctiva bulbi was also involved. The ball was enucleated, the orbit eviscerated, and the affected portion of the lids and skin removed, the defect then being covered by means of pedunculated flaps from the forehead and temple. In another case the epithelioma involved the inner third of the upper lid, the entire lower lid, and the skin of the bridge of the nose, and passed into the orbit above the internal rectus, the eye being otherwise unaffected. The tumor was removed with preservation of the ball, and the defect covered by means of pedunculated flaps from the region of the brow.

In a case of total symblepharon after a burn with lime, Franke (230) separated the ball from the lid, and transplanted a skin flap from the arm, placing it in such a way that one half of the flap covered the tarsus, and the other half the sclera. The result was satisfactory.

In Scott's (231) cases, the upper lid was adherent to the upper part of the cornea as the result of using a popular remedy. Particulars are given illustrating the ignorant self-maltreatment, and the fatalistic and careless neglect of the eyes which prevails in Egypt. Werner.

Keber (232) gives an illustration of gummata occurring on both lids of the eyes in a negro of 39 who had the initial lesion three years ago. There were similar tumors scattered over the body. Burnett.

Alt (233) describes the character of a tumor of the lid which had all the appearances of a chalazion. It was not painful, and had been increasing in size for six weeks. The tumor was removed, and found to consist almost entirely of muscular fibres, some old and striated, interspersed with younger ones, some not yet past the stage of long spindle cells. There were numerous round cells between the fibres, and some collections of them in masses at points, particularly near the vessels.

BURNETT.

In the case reported by LAMBERT (234) the tumor of the upper lid was considered at first to be a chalazion, and so treated. The curetting, however, reduced it only slightly in size, and the walls remained thickened and hard. The whole mass was finally enucleated, and it was found by Weeks to be a tumor of an epitheliomatous character, with but a slight tendency to malignancy.

BURNETT.

VIII.—LACHRYMAL APPARATUS.

235. FAGE. Pseudo-diphtheritic bacilli in a case of dacryocystitis. *Soc. d'opht. de Paris*, Jan. 7, 1896.

236. EWETZKI. Actinomycosis of the lachrymal canaliculi. *Arch. d'opht.*, xvi., 4, p. 209.

237. GALEZOWSKI. Exostosis of the nasal duct as a cause of epiphora, and its treatment. *Rec. d'opht.*, 1896, No. 2, p. 166.

238. PICCOLI. Carcinoma of the lachrymal sac. *Lav. d. clinica ocul. d. R. Univ. di Napoli*, iv., 3, p. 256.

239. BASEVI. The leptothrix buccalis and the pyogenic salivary micro-organisms in the affections of the lachrymal canaliculi. *Ann. di Ottalm.*, xxv., 2–3.

In the secretion of an acute dacryo-cystitis following a chronic lachrymal catarrh, FAGE (235) found a bacillus identical with the diphtheria bacillus which, inoculated on man and animals, proved to be innocent.

SULZER.

EWETZKI (236) reports a case of actinomyces of the lower canaliculus, with a microscopic description of the fungus removed. He believes that this is the same fungus that has been found in the other cases of leptothrix disease of the canaliculi. The healthy mucosa of the canaliculus furnishes a poor medium for the development of the fungus, hence its slow growth and the benign course of the affection.

v. MITTELSTÄDT.

In scrofulous individuals GALEZOWSKI (237) finds exostosis of the nasal duct a case of stenosis. The exostosis is most frequently found at the lower end of the duct but it may be higher up. In such cases one finds complete closure of the duct without disease of the mucosa or bone and without secretion in the lachrymal sac.

The exostosis prevent the passage of ordinary sounds, but the author obtains good results by the use of conical sounds.

SULZER.

In a case of conjunctivitis of several weeks' duration, BASEVI (239) found the lower canaliculus stopped with a yellowish plug. After splitting the canaliculus a foul-smelling mass was removed containing leptothrix and staphylococci. The history revealed the fact that the patient had been in the habit of moistening the lids with saliva. A short treatment with antiseptics led to complete recovery. DANTONE.

IX.—MUSCLES AND NERVES.

240. FÖRSTER. On the therapy of squint. Breslau, 1896.

241. PACETTI. On functional paralysis of the ocular muscles. *Il Policlinica*, March, 1896.

242. KUNN. A case of ophthalmoplegia externa. *Wiener klin. Wochenschr.*, 1896, No. 10.

243. ZIMMERMANN, OTTO. On associated lateral paralysis of the ocular muscles with preservation of convergence. *Inaug. Dissert.*, Strasburg, 1896.

244. KRIEG, PAUL. The congenital defects of ocular motility. *Inaug. Dissert.*, Giessen, 1896.

245. REESE, R. C. A case of traumatic paralysis of the cervical sympathetic with oculo-pupillary symptoms following forceps delivery. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1896.

246. EDSALL and DIELER. A case exhibiting bilateral palsy of the superior rectus muscle, the iris and ciliary muscle, with loss of power of convergence. *Annals of Oph. and Otol.*, April, 1896.

247. CRAIG, F. A. Paralysis of the sixth and seventh nerves occurring in a patient with whooping cough. *Brit. Med. Journ.*, June, 1896, p. 1440.

248. AYRES, S. C. Ophthalmoplegia externa complete with preservation of accommodation and activity of the pupils. *Amer. Journ. of Ophth.*, March, 1896.

249. PRICE, G. H. Paresis of accommodation in a young patient following la grippe. *Oph. Record*, April, 1896.

250. VALK. The indications for operating in insufficiency of the ocular muscles. *Ibid.*, May, 1896.

Pacetti (241) calls attention to the various phenomena observed by him in three cases of oculo-motor paralysis. The ptosis disappeared, *i. e.*, the levator began to functionate again, as soon as the healthy eye was covered with the hand, but the ptosis reappeared when the patient was again allowed to fix with the healthy eye. Dantone.

In a man of twenty-five, otherwise healthy, Kunn (242) observed ocular-muscle paralysis of peculiar variability. Excessive ptosis alternated with slight ptosis ; convergence was at one time abolished, at another time normal ; in downward fixation strabismus alternated with a symmetrical position of the eyes. The influence of fatigue of the ocular muscles on their function was always noticeable. The clinical picture indicated an asthenic ophthalmoplegia.

Zimmermann's (243) patient, a girl of nineteen, after a cold bath suffered an incomplete paralysis of associated lateral motility of the eyes while the ability to converge was normal.

Reese (245) reports a case of the ocular symptoms, namely, falling of the lid, contraction of the pupil, and sinking of the globe in the orbit, accompanying paralysis of the cervical sympathetic—caused by forceps in an instrumental delivery.

Burnett.

In the case reported by Edsall and Dieler (246) a man of fifty-two had a fall on the head four years before, after which various nervous symptoms developed, and among them ocular palsies. His speech is slow, his movement clumsy, and he complains of pain in the occipital region and along the spine ; no disorder of sensation ; reflexes good. V R $\frac{20}{30}$; L p. l., with evidence of a past neuritis. There is complete paralysis of the superior recti of both eyes, with weakness of the interni. External recti and obliques apparently normal, pupils contracted and respond but faintly to any stimuli ; state of A not given.

Burnett.

Craig's (247) patient a child aged three. No syphilis or tubercle in family. Paralysis of left side of face and left external rectus occurred three weeks after the whooping cough began. One paroxysm of coughing caused epistaxis ; this was the only hemorrhage which occurred. The frontalis and orbicularis oculi were very much weakened, but the eye could be closed. The paralysis was unaltered in nine months. According to Gowers this was a case of infra-nuclear paralysis. If we admit with

Gowers that the structure subserving inward movement of the opposite eye may escape in a lesion of the sixth nucleus, then the lesion may be here. Werner.

Ayres (240) reports a case of complete bilateral ophthalmoplegia exterior with preservation of power in the iris and ciliary muscle, in a man thirty-eight years of age. The patient states that his maternal grandfather was similarly affected, but his mother told him that he became affected after an attack of scarlet fever at six years of age. Vision is good and he has no asthenopia, and is otherwise perfectly healthy. Burnett.

In Price's (249) case a young man of eighteen had a very weak accommodation, requiring + 2.50 or + 3 for reading, which seems to be the residuum of a paralysis of several, or all, of the ocular muscles following an attack of la grippe six years before. Burnett.

In testing for insufficiencies Valk (250) does not use the Maddox rod or any of its equivalents, but relies upon the power of the different muscles to overcome prisms. The relation of the internus to the externus should be 2 or 3 to 1, and he has rarely seen eyes in which the externus could overcome an 8° prism or the internus an 80° prism. The inferior rectus is slightly stronger, normally, than the superior. In operating he uses three methods: 1st, a partial tenotomy, leaving a few central fibres ; 2d, a complete tenotomy, very carefully made ; and 3d, a shortening of the muscle by taking a tuck in it by means of a cat-gut suture as has been before described by him. Burnett.

X.—ORBIT AND NEIGHBORING CAVITIES.

251. Woodward. Pulsating exophthalmus ; rupture of the left carotid in the cavernous sinus (?). Ligation of the carotid and ligation later of the arterial anastomoses of the internal angle of the eye ; recovery. *Ann. d'ocul.*, cxv., p. 286.

252. De Bono. Pulsating exophthalmus from adeno-angioma of the orbit. *Arch. di ottalm.*, iii., 6–8, p. 215.

253. Knapp. A case of cavernous angioma of the orbit ; removed with preservation of the eyeball. *Arch. f. Augenheilk.*, xxxii., p. 271.

254. De Vincentiis. The state of the eye and its adnexa in a patient operated on a year before for a tumor of the optic nerve. *Lav. d. Clin. Ocul. d. R. Univ. di Napoli*, iv., 3, 202.

255. Adelheim. A case of bilateral affection of the labyrinth of the ethmoid in the form of the so-called mucocele labyrinthi ethmoidalis. *Wjest. ophth.*, xiii., 3, p. 223.

256. Gruening. On orbital fistulæ due to ethmoidal disease and their treatment. *N. Y. Eye and Ear Infirmary Reports*, January, 1896.

257. Ridley, J. Brooke. Orbital tumor: thirty years' growth; history of injury (illustrated). *Brit. Med. Jour.*, 1896, p. 292.

258. Doyne, R. W. Dermoid tumor of the orbit. *Oph. Rev.*, xv., p. 97.

259. Johnson, Raymond. Traumatic orbital aneurism. *Brit. Med. Journ.*, 1896, p. 276.

In de Bono's (252) case of pulsating exophthalmus from orbital tumor, ligation of the carotid brought about some improvement but it was only of short duration. Paralysis followed, and after some months, death. At the autopsy it was found that the tumor had perforated the walls of the orbit and passed into the brain. Histological examination showed it to be an adeno-angioma arising from the lachrymal gland. Dantone.

Knapp (253) removed from the right orbit of a man of thirty-nine, an angioma 27 *mm* long, 24 *mm* broad, and 18 *mm* thick. It lay in the medial portion of the orbit. The extirpation was done without injuring the optic nerve or the eyeball.

De Vincentiis (254) reports on the patient from whom he had extirpated a retrobulbar optic-nerve tumor a year before (see these Archives, 1896, No. 1, p. 161). The fear that the eyeball, which was left in position, would be destroyed in consequence of the division of the ciliary nerves, has not been justified. The ball recovered its sensibility and partially its mobility, but a convergent squint developed which, however, was corrected by operation. Dantone.

Adelheim's (255) patient, a man of twenty-one, was operated on for the removal of a tumor as large as a walnut, lying above the internal palpebral ligament on the inner wall of the right orbit and causing exophthalmus and diplopia after developing for two or three weeks without pain. The tumor was cystic, and contained a tenacious mucus. The sac adhered to the inner wall of the orbit so firmly that a portion of it remained in spite of curetting, leaving a permanent fistula above the upper lid. Three years later a tumor as large as a hazel-nut appeared in the left orbit, which after the use of hot applications and a pressure bandage disappeared, according to the patient's statement. Four months later it reappeared and became red, painful and œdematous. Exophthalmus upward and outward, and diplopia. The tumor was hard and was as large as a walnut. The patient had fever and evening chills, and complained that the nose was stopped. The middle turbinate was found to be swollen, with hyperæmia and œdema of the nasal mucosa and muco-purulent discharge. The author made a diagnosis of mucocele of the ethmoid cells, which had passed on to suppuration after accidental infection from the nose. The tumor was removed, an opening being made in the inner wall of the orbit leading into the ethmoid cells which were filled with pus. These were scraped out and a T-formed drainage tube was introduced with one tube lying in the nose. The patient recovered completely. HIRSCHMANN.

GRUENING (256) reports two cases of fistula of the orbit just above the internal canthal ligament due to disease of the ethmoid, which were cured by forcing an opening through the base by means of a strong probe into the nasal cavity, thus facilitating drainage through the nose. BURNETT.

RIDLEY'S (257) patient, a man æt. forty-six, got a black eye from a blow thirty years ago. A year after sight began to fail and eye to protrude. At present there is a displacement down and out, with limitation of movement; firm, elastic tumor at inner angle; free edge of orbit intact; occasional headache; optic atrophy, tortuous veins; no enlarged glands or involvement of neighboring cavities; no bruise, etc. WERNER.

DOYNE'S (258) patient began to notice protrusion of the eye three weeks previous to his visit, no diplopia, limitation of outward movement. A hard edge of something in position of lachrymal gland was felt. It proved to be a cyst filled with atheromatous material. The outer wall of the orbit was absent, and no bony limit could be felt behind. The parts contracted very well after operation. WERNER.

The patient, a woman æt. forty-four, was shown by JOHNSON (259) at the Clinical Society, London. She fell on her back, was unconscious seven hours, then vomited and at once noticed blood-shot appearance and swelling of left eye. A buzzing noise came on the next day; no venous congestion; no pulsation; loud arterio-venous murmur; fundus normal; paralysis of sixth nerve. I have had a case exactly similar in a man, which was cured by a ligature of the left common carotid. There was a history of a not very severe fall, which was followed by protrusion of the eye, with almost complete immobility, no venous distension or swelling, fundus normal, no pulsation, but loud murmur all over head and over malar bones, with very well marked systolic reinforcements. Murmur arrested by compressing carotid on same side. Patient recovered completely in a week's time after ligature of common carotid. Mobility of eye completely restored.

WERNER.

XI.—CONJUNCTIVA, CORNEA, SCLERA, AND ANTERIOR CHAMBER.

260. COHN, H. On the extent and prevention of ophthalmia neonatorum in Germany, Austria, Holland, and Switzerland. Berlin, 1896. O. Coblentz.

261. HOSCH. Credé's prophylactic measure. *Jahresber. d. allg. Poliklinik des Cantons Basel-Land*, 1896.

262. WOLFFBERG. Rules for preventing ophthalmia neonatorum and for preventing its extension. 3d edition. Breslau, 1896.

263. KNIES, M. Gonorrhoic conjunctivitis and its treatment. *Samml. zwangloser Abhandl. aus dem Gebiete der Augenheilk.*, edited by Vossius, i., part 5.

264. HOOR. Kalt's irrigation treatment for blennorrhœa. *Centralbl. f. prakt. Augenheilk.*, 1896, p. 233.

265. SAMEH. Pseudo-membranous conjunctivitis and its clinical forms in Egypt. *Rec. d'opht.*, xviii., 1, p. 15.

266. COPPEZ. Ocular diphtheria without false membranes. *Rev. génér. d'opht.*, 1896, p. 51.

267. RIPAULD. A case of diphtheria of the conjunctiva and lids treated with antitoxin. *Annal. d. maladies de l'oreille et du larynx.*, 1896, p. 138.

268. TAILOR. Pseudo-diphtheritic conjunctivitis. *Lav. della clin. Ocul. d. R. Univ. di Napoli*, iv., 3, p. 273.

269. GREEFF. Antitoxin in ocular diphtheria and in post-diphtheritic paralysis of the ocular muscles. Sammelbericht. *Deutsche med. Wochenschr.*, 1896, No. 37.

270. EWETZKY. On diphtheritic conjunctivitis and its treatment with antitoxin. *Berliner klin. Wochenschr.*, 1896, No. 31.

271. SUBAW. Summer catarrh of the conjunctiva in middle Asia. *Wratsch*, 1896, Nos. 17, 18, and 20.

272. PROPOPENKOW. The treatment of trachomatous pannus. *Wjest. Ophth.*, 1896, No. 2.

273. MALGAT. Trachomatous immunity. Monocular trachoma. *Rec. d'opht.*, 1896, 1, p. 9.

274. BASEVI. On the surgical treatment of granular ophthalmia. *Annal. di Ottalm.*, xxv., 2, 3, p. 275.

275. SÄHN. Trachoma in Schleswig-Holstein. *Inaug. Dissert.*, Kiel, 1896.

276. GASPARINI. Bacteriology of acute conjunctivitis. *Annal. di Ottalm.*, xxv., 1, p. 13.

277. DE WECKER. Scraping the cornea for pterygium and ribbon-shaped keratitis. *Soc. d'opht. de Paris*, Jan. 7, 1897.

278. AVEINI. Observations on granulomata of the conjunctiva from foreign bodies. *Arch. di Ottalm.*, iii., 7, 8, p. 208.

279. NUYTS. A case of traumatic transplantation of lashes into the conjunctiva. *Rec. d'opht.*, 1896, No. 5, p. 276.

280. HOOR. A successful attempt to prevent the re-attachment of the surfaces of the wound after symblepharon operations. *Wiener med. Wochenschr.*, 1895, No. 35.

281. WEEKS. Papilloma of the conjunctiva and cornea. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1896.

282. HERRON. Ophthalmia neonatorum in utero, resulting in ulceration and perforation of cornea of right eye before birth. *Oph. Rec.*, April, 1896.

283. COE. A new method of treating pterygium. *Annals of Oph. and Otol.*, April, 1896.

COHN (260) gives the number of persons blind from blennorrhœa in the institutions for the blind in Germany, Austria, Holland, and Switzerland. The German, Austrian, and Swiss institutions have on an average 20 %, the Dutch 13 %. In the German institutions 20 % are under ten years of age, in the Austrian 23 %, in the Swiss 31 %, and in the Dutch all are under 10. Blennorrhœa was found 1938 times among 302,971 patients. Of 710 children with blennorrhœa, 506 were discharged cured, and 141 suffered permanent damage to sight. Gonococci were found 293 times among 498 cases. Thirty-nine mothers had previously had children with blennorrhœa. Cohn recommends Credé's procedure.

Hosch (261) reports on the outbreak of a typical blennorrhœa neonatorum in spite of the use of Credé's method. He believes that it suffices to recommend to mothers and midwives extreme cleanliness and the washing out of the infant's eyes with an indifferent fluid such as boric acid solution.

Knies (263) states that ophthalmia neonatorum is not always caused by the gonococcus. As treatment he uses ½ % sulphate of zinc or 2 % silver solution, and as a preventive measure he recommends Credé's procedure. The prognosis is worse in blennorrhœa of older individuals. He recommends a continued hot bath of 40° C., since a continued body temperature of 40° causes the gonococci to disappear.

Hoor (264) does not use excessive irrigations with a weak solution of permanganate of potash as recommended by Kalt, but he washes out the conjunctival sac with bits of cotton dipped in the solution.

Following Sourdille, Aubineau, and others, Coppez (266) describes a diphtheritic conjunctivitis without pseudo-membranes, and he reports two new case-histories of this sort. If antitoxin is used while a diphtheritic conjunctivitis is limited to one eye, there will be only a slight pseudo-membrane or merely a catarrhal conjunctivitis in the second eye, the antitoxin acting as a prophylactic. Sulzer.

Tailor (268) describes a peculiar pseudo-form of diphtheria in which the affected part is not swollen, nor does it show a membrane or a special discharge, but it becomes necrotic and sloughs off, leaving an ulcerated surface. Investigation showed that the disease depended upon a bacillus which differed considerably from the Löffler bacillus and which the author regards as a variety of the bacterium coli. Dantone.

According to Subaw (271) a peculiar inflammation of the conjunctiva appears annually in the region between Uzun-Ada and Samarcand, and, according to others, in the whole of middle Asia. The epidemic begins in June, is most intense in July, and disappears about the end of November. Although it occurs in the period of greatest heat, it seems not to be dependent upon this. In the summer the weather is excessively warm and there is much dust. In the winter, eye diseases form only 3 % of all diseases, but in the summer 22 %. The affection manifests itself by hyperæmia of the conjunctiva, usually of one eye only, and lachrymation, followed in some hours by œdema of the lids and chemosis of the conjunctiva. The secretion is slight. The patient complains of itching and pain. The conjunctiva remains smooth and but little infiltrated. On the third day the pain and swelling decrease, and the secretion becomes purulent. The inflammation disappears without a trace on the seventh or eighth day. The disease is very contagious. The author found in the secretion, both free and in the epithelial cells, small bacilli, some uniformly stained, others showing regular constrictions up to the number of four. The ends of the bacilli are not rounded. Culture experiments were not successful. The author believes that these bacilli cause the disease and that this inflammation corresponds to Koch's milder form of Egyptian ophthalmia.

In pannus, PROPOPENKOW (272) cauterizes the cornea with the sulphate of copper stick except when ulcers are present, and he gets good results from this treatment. HIRSCHMANN.

In Nice, where trachoma is not rare, MALGAT (273) has had under observation a number of families in which only one or a few members of each have had trachoma, notwithstanding the constant association with the affected members who have usually been scrofulous or debilitated. The author therefore concludes that the healthy members of the family are immune, and since unilateral trachoma occurs, certain cases must be considered non-contagious. SULZER.

In nine obstinate cases of trachoma that did not yield to the sublimate treatment, BASEVI (274) made a number of incisions in the affected tissue and scraped it with a sharp spoon. In the chronic and hypertrophic forms and particularly when there are corneal complications, the author scarifies and uses nitrate of silver, although he recognizes that this procedure often leads to unpleasant cicatrization. DANTONE.

GASPARINI (276) states that of the purulent inflammations of the conjunctiva, blennorrhœa excepted, that are due to pyogenic microbes or to Weeks's bacillus, there is a fourth form clinically similar to the last, but caused by the Fraenkel diplococcus. This appears in children in an acute form, and in adults in a chronic. The author reports a series of observations in which bacteriological examination left no doubt of the causative microbe being the diplococcus. DANTONE.

DE WECKER (277) in operating on pterygium, simply scrapes off the growth, following this with antiseptic irrigations. In this way he obtains, without any plastic operation, the cure of small and moderate-sized pterygia, and a very satisfactory clearing up of the opaque portion of the cornea. This simple operation is specially adapted to fresh cases of pterygium, and it also gives good results in ribbon-shaped keratitis. SULZER.

The cases of implantation of cilia in the anterior chamber are much more frequent than those of implantation in the conjunctiva. NUYTS (279) adds a second case to the only one of the latter previously reported. The trauma was caused by a stick striking the eye below the cornea and carrying into the conjunctiva a number of lashes, which soon caused marked irritation.

SULZER.

After the operative separation of a symblepharon, HOOR (280) laid, between the lid and ball, a piece of the membrane lining the shell of a hen's egg, which was replaced by a fresh piece each day. In the course of three weeks there was perfect cicatrization without a new symblepharon.

WEEKS (281) gives the histories and histological characteristics of 3 cases of papilloma of the conjunctiva, which also involved the cornea, which he had himself observed, and brief abstracts of several others which are found in ophthalmic literature. Those tumors show a great disposition to recur, but are not malignant. The growth does not involve the normal structure beneath the epithelium. If a thorough removal is effected, the cornea may remain transparent. BURNETT.

HERRON (282) reports a case of opacity of the centre and perforation of right cornea, with prolapse of iris, in an infant two weeks old. There was at that time but little swelling of the lids, and there had not been any discharge of matter since the birth of the child. BURNETT.

COE (283) treats pterygium by touching the apex with a platinum probe heated to redness. This causes, he says, the vessels of the mass to shrivel up and disappear. BURNETT.

284. DE VINCENTIIS. Ulcer of the cornea from colloid degeneration. *Lavori della Clinica Ocul. d. R. Univ. di Napoli*, iv., 3, p. 305.

285. LODATO. Hypodermic injections of metallic iodine in parenchymatous keratitis. *Arch. di Ottalm.*, iii, 7, 8, p. 243, and *Boll. d'Ocul.*, xviii., 1, p. 5.

286. UOTA. On superficial keratitis of slow course and its treatment. *Il Policlinico*, 1896, Jan. 1.

287. GALLENGA. Brief observations on dendritic keratitis. *Ann. di Ottalm.*, xxv., 2–3, p. 224.

288. HIRSCHBERG. On the new-formed vessels of the cornea and their diagnostic significance. *Deutsch. med. Wochenschr.*, 1896.

289. HIRSCHBERG. Hemorrhage into the cornea. *Centralbl. f. prakt. Augenheilk.*, 1896, p. 177.

290. DOR. Contribution to the clinical study of effusions of blood into the cornea. *La clinique de Bruxelles*, 1895, No. 34–37.

291. FALTA. On opacity of the cornea, and massage. *Pester med.-chirurg. Presse*, 1896, No. 25.

292. GALLENGA. Corneal fibroma, and especially fibroma arising from a cicatrix. *Arch. di Ottalm.*, iii., 9–10, p. 269.

293. FOOTE, C. J. Bacteriology of the normal conjunctiva. *Med. Record*, May 30, 1896.

294. LEWIS, F. N. Jequirity in the treatment of pannus. *Manhattan Eye and Ear Hospital Reports*, Jan., 1896.

295. HULEN, V. H. A report of cases of extensive wounds of the globe. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1896.

296. WOOD, CASEY A. A case of pigmentation of the cornea. *Annals of Ophth. and Otol.*, April, 1896.

297. COOVER, D. H. Peritomy in severe forms of episcleritis. *Oph. Record*, May, 1896.

DE VINCENTIIS (284) gives a detailed clinical and histological description of colloid degeneration of one portion of the cornea and an ulcer that developed in it. DANTONE.

LODATO (285) reports two cases of parenchymatous keratitis of scrofulous origin, in which injections of iodine 1., potas. iodid. 10., and water 100. every second day led to a speedy recovery. Ten or fifteen injections caused the cessation of the symptoms of irritation and produced a clearing up of the cornea. When the keratitis is of syphilitic origin the treatment is without effect. Since the injections are painful the point should be anæsthetized with ether. DANTONE.

In obstinate corneal inflammations UOTA (286) has used subcutaneous iodine injections with success. DANTONE.

GALLENGA (287) has seen two cases of dendritic keratitis in men aged about forty within six months. In both, the narrow stripe passed beyond the centre of the cornea, but did not reach the opposite margin. Subconjunctival injections were successfully used. In the detritus of the ulcer some microbes were found, but cultures remained sterile. The author also speaks of Horner's herpes cornealis febrilis, which he has seen in 0.39 per cent. of his patients. DANTONE.

After an historical introduction HIRSCHBERG (288) describes interstitial keratitis. This diffuse inflammation, usually due to hereditary syphilis, always causes the new formation of vessels, which never entirely disappear. They mostly lie deep in the tissues, where they branch like birch twigs, and some few are superficial. The corneal changes in ocular tuberculosis and scrofula have an entirely different course. In sclerosing marginal keratitis the vessel formation is limited to the periphery of the cornea, and bundles of thick vessels are seen lying among the cloudy patches in the cornea. The deeper ulcers of the cornea heal with the new formation of vessels which run from the corneal margin to the floor of the ulcer. Trachomatous pannus consists of a superficial vascular network, and in phlyctenular pannus the vessels are similar. In all cases the vessels remain during the patient's whole life, and even years after the inflammation, may furnish a clew to the nature of the original disease.

In a boy of ten, who had received a blow, HIRSCHBERG (289) found a hemorrhage throughout the entire parenchyma of the cornea, hyphæma, and a rupture of the iris. The blood was absorbed after a considerable time, and some years later the vision was relatively good.

FALTA (291) recommends massage for clearing up the opacities of the cornea remaining after inflammations. Since the physiological nutrition in the periphery of the cornea is better than in the centre, the prognosis is better in the case of peripheric opacities. The massage is done through the upper lid with a piece of cloth, the other eye being kept open in order to control the motions of the eye. HERRNHEISER.

GALLENGA (292) gives a detailed histological description of a fibroma which was removed from the cornea of a child of two, after a partial corneal staphyloma had been removed a year before. The author compares his case with several previously reported and suggests that such tumors be called cicatrix fibromas, since this designation most clearly expresses the nature of the disease.

FOOTE (293) in his examination has found many kinds of bacteria—mostly innocuous—on the normal conjunctiva, but often there are no bacteria at all. Washing the conjunctiva cannot be *depended* upon as a means of sterilization. Aseptic dressing applied over the normal eye after twenty-four hours shows growth of bacteria. BURNETT.

LEWIS (294) uses jequirity still in the treatment of the pannus of trachoma and finds it useful and with care not dangerous. He uses the powder, dusted on the conjunctiva, and not the infusion. BURNETT.

HULEN (295) reports thirteen cases of injury to the globe, principally ruptures of the sclera and cornea, in which efforts were made to save the ball. Most were successful. Two had to be enucleated subsequently. BURNETT.

WOOD'S (296) case of pigmentation of the cornea was in a man of fifty-six years who had glaucoma and on whom an iridectomy was made. The pigmentation came on after the operation, during which there was bleeding in the anterior chamber. The author thinks the pigmentation is due to the coloring matter of the blood. BURNETT.

COOVER (297) gives the histories of two cases of episcleritis which he treated by means of a peritomy, denuding the sclera for 5 *mm* back from the corneal edge. BURNETT.

Sections XII.–XXI. Reviewed by Dr. SILEX.

XII.—IRIS.

298. MASSANT. Experimental investigations on the course of the fibres for the pupillary reflex. *Arch. f. Psych. u. Nervenkrankheiten*, xxviii.

299. CASPAR. A case of unilateral reflex iridoplegia. *Arch. f. Augenheilk.*, xxvii., p. 291.

300. BARDELLI. On the etiology of the iritis following streptococcus conjunctivitis. *Ann. di Ottalm.*, xxv., 1, p. 57.

301. BACCHI. Therapy of prolapse of the iris. *Ibid.*, p. 3.

302. GALLENGA. On gumma of the ciliary body. *Annal. di Ottalm.*, xxv., 2–3, p. 210.

303. WERTHER. On sarcoma of the iris. *Arch. f. Augenheilk.*, xxxii., p. 297.

304. FOSTER, M. L. Irido-dialysis. *Manhattan Eye and Ear Hospital Reports*, Jan., 1896.

305. Westphal. A case of multiple ruptures of the iris between the pupillary and ciliary margins. *Zehender's klin. Monatsbl.*, xxxiv., p. 201.

Massant (298) in his paper reviews the opinions of various authors on the course of the fibres for the pupillary reflex, and then passes to his own investigations made with the Marchi stain on eleven rabbits from which he had removed the iris. His results in the main corroborate those of other investigators. He finds that the pupillary fibres run in the optic nerve and tract, and thence pass to the inner portion of the stratum zonale and to the upper white layers of the corpora quadrigemina. From the stratum zonale the pupillary fibres pass through the lower segment of the posterior commissure to enter the oculo-motor nucleus.

In a patient of thirty-eight Caspar (299) found the left pupil unresponsive to light and consensually, but reacting in accommodation. In explaining this phenomenon he follows Heddæus, who believes that there is an affection of the centrifugal fibres from the oculo-motor nucleus, at some point central to the union of these fibres with a supposed accessory bundle of fibres from the accommodation nucleus.

Bardelli's (300) experiments on rabbits with streptococcus toxines led to the following results: 1. A subconjunctival injection caused a muco-purulent conjunctivitis lasting four to six days. 2. An injection into the anterior chamber caused a serous or plastic iritis which soon passed off. 3. Repeated instillations into the conjunctival sac caused first a marked conjunctivitis and later keratitis and iritis. The inflammatory processes soon ceased when the instillations were left off. It is questionable whether the results would be the same in the human eye.

Dantone.

Bacchi (301) does not advise cutting off a prolapsed iris externally, since other portions of the iris then prolapse, but he recommends loosening the iris from the anterior chamber with a curved spongiotome after a small opening has been made with a narrow lance knife for the passage of the other instrument. The author has frequently operated on rabbits with an artificially produced prolapse and has also done it on men with good results. A necessary condition for the success of the operation is that the iris be no longer movable between the margins of the ulcer.

Dantone.

GALLENGA (302) describes two cases of syphilitic gumma of the ciliary body. In both cases the tumor passed through the iris angle into the anterior chamber and invaded the iris, which was also the seat of the usual condylomata. In one case there was a perforation of the sclera and conjunctiva through which the most of the broken-down tumor mass was evacuated. Under treatment the results in both cases were good. DANTONE.

Fuchs in his monograph on sarcoma of the uveal tract records 16 cases of sarcoma of the iris out of a total of 259. Since then 23 new cases have been seen, and WERTHER (303) now adds two fresh cases, both of pigmented spindle-celled sarcoma. He favors enucleation, since many cases apparently cured by iridectomy come later to enucleation, and the danger of metastasis is greater. In his cases, when examined clinically, iridectomy seemed to be indicated, but the microscopic examination showed that it would have been impossible to have removed the tumor thoroughly in this way.

In some cases of anterior synechia FOSTER (304) has divided the connected part of the iris by means of the sickel-knife needle of Weeks, which possesses many advantages over the straight Graefe knife for the purpose. He suggests the name of iridolysis as appropriate to such a section of the iris. BURNETT.

In WESTPHAL'S (305) case the ruptures were due to the action of a blunt force.

XIII.—CHOROID.

306. STRZEMINSKI. Essential phthisis bulbi. *Rec. d'opht.*, 1896, p. 206.

307. GOLLER. A case of bilateral metastatic panophthalmitis following sepsis, without a fatal result. *Inaug. Dissert.*, Würzburg, 1893.

308. DUNN, JOHN. A case of binocular extra-papillary coloboma. *Virginia Med. Semi-Monthly*, June 12, 1896.

Under the name essential phthisis bulbi STRZEMINSKI (306) describes the case of a man of twenty-two who complained of secretion of mucus and diminution of sight in the right eye and also of circumorbital pain. The eye was lessened in all its dimensions; there was enophthalmus and slight ptosis, and tension was reduced. The eye was not inflamed, but the cornea was slightly cloudy. The sensibility of the cornea and conjunctiva was diminished and pressure on the ciliary body was somewhat painful. The skin of the right lids and right side of the face was reddened. Bromide of potassium and morphine injections were used, and nine days later the intra-ocular tension began to increase, and four days later the eye again became normal. A month later a similar attack came on lasting eleven days.

SULZER.

DUNN (308) figures a case of binocular extra-papillary coloboma of the choroid in which retinal vessels—on one side both vein and artery and on the other an artery—crossed the coloboma. There was good central vision in both. There was no scotoma for white, showing that the retina was not involved in the process.

BURNETT.

XIV.—GLAUCOMA.

309. PERGENS. On adenoma of the ciliary body as a cause of glaucoma. *Arch. f. Augenheilk.*, xxxii., p. 293.

310. SIMON. On peripheric scotoma in glaucoma. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 103.

311. SGROSSO. A clinical contribution to the treatment of glaucoma by incision of the tissues of the iris angle. *Lav. della clinica ocul. d. R. Univ. di Napoli*, iv., 3, p. 227.

312. TAILOR. On incision of the tissues of the iris angle. *Ibid.*, p. 197.

313. HAHNLOSER. The results of the treatment of glaucoma in the Zurich clinic in the years 1865–95. *Inaug. Dissert.*, Zurich, 1896.

314. TORNABENE. A case of hemorrhagic glaucoma consecutive to thrombosis of the central vein of the retina. *Arch. di Ottalm.*, iii., 9–10, p. 30c.

315. BERGMEISTER. A case of hydrophthalmus cured by iridectomy. *Wiener klin. Wochenschr.*, No. 18.

SIMON (310) calls attention to the fact that besides the central and paracentral scotomata that have been described in glaucoma, there are also found peripheric scotomata, absolute or relative, which may be of diagnostic and prognostic value. The determination of these scotomata, which is best done with paper quadrants 1.5–5 *mm* in size, requires a certain amount of intelligence and attention on the part of the patient. These scotomata in the beginning have always a curved form.

SGROSSO (311) reports on cases of glaucoma in which he has incised the iris angle. Eleven cases were glaucoma simplex, 2 chronic glaucoma with symptoms of irritation, and 2 glaucoma in children with beginning buphthalmus. The tension was quickly diminished in all and the vision improved. In one case there was a relapse a month later. DANTONE.

TAILOR (312) again discusses the incision of the iris angle as recommended by De Vincentiis for reducing intra-ocular tension. The operation has already been done in 62 cases of glaucoma of various forms and the results are more than satisfactory.

DANTONE.

HAHNLOSER (313) reports on 50 cases of inflammatory glaucoma and 47 cases of glaucoma simplex. The patients were kept under observation for years. The medicamentous treatment gave the poorest results, sclerotomy better results, and iridectomy the best. Sclerotomy is often useful when iridectomy has been unsuccessful.

TORNABENE (314) observed a case of hemorrhagic glaucoma in an eye blind for ten months from thrombosis of the central vein and hemorrhages into the retina. The author reviews the opinions on the origin of thrombosis, not doubting a connection between this and glaucoma, since thrombosis of the veins, congestion and alterations in the vessel wall are frequently found in glaucoma, but he thinks a satisfactory explanation of the connection has not yet been given. DANTONE.

BERGMEISTER (315) presented a boy of thirteen on whom he had done a successful iridectomy at the age of six months for infantile glaucoma (increased tension, diffuse opacity of the cornea, moderate enlargement of the ball, etc.). There was now a normal anterior chamber, no excavation of the disc, and the ability to count fingers near by, the patient having had strabismus since infancy. Worthy of note in this case was an opacity of the equator of the lens in the coloboma, which Bergmeister believed to be due to the contact of the infantile lens with the operation wound.

XVII.—LENS.

316. GRADENIGO. On capsulo-lenticular extraction of cataract. *Ann. di Ottalm.*, xxv., 1, p. 77.

317. BOGGI. A case of spontaneous complete luxation of the lens. Reduction by massage. *Ibid.*, p. 7.

318. Rennschewitsch. On glaucoma after cataract extraction. *Zehender's klin. Monatsbl.*, xxxiv., p. 191. (Two cases after extraction, not cured; one after discission of secondary cataract, cured by iridectomy. H. K.)

319. Taylor, C. Bell. The accidents of lens extraction. (Nothing new.) *The Lancet*, 1896, p. 158.

320. Trefontaine, L. A. Summary of operations for cataract, done at the New York Eye and Ear Infirmary from October, 1894, to October, 1895. *Eye and Ear Infirmary Reports*, Jan., 1896.

Gradenigo (316) has again taken up the extraction of cataract in the capsule. After the section he endeavors to rupture the zonula in its entire extent by means of a hook like a squint hook, and he then presses out the cataract, using a ring-shaped spoon. Of the 25 cases so operated the manœuvre was successful in 20, a clean pupil being secured. In the other 5 the capsule ruptured and remained in the eye without, however, prejudicing the result. No prolapse of vitreous occurred. Dantone.

Boggi (317) describes a case of luxation of the lens into the vitreous which caused no symptoms for three years, and then from some unknown cause the lens having passed into the anterior chamber, the eye became very painful. As the author was about to resort to an operation, Rampoldi suggested massage, which being done with the fingers on the closed lids, forced the cataractous lens back into the vitreous. To prevent recurrence, the pupil was kept small by miotics. Dantone.

320. There were 169 extractions at the N. Y. Eye and Ear Infirmary during the year. 79.33% were simple extractions. 13.01% with iridectomy; 4.73% linear extractions and needlings. Prolapse of iris occurred in 12.43% of cases. The average time of its appearance was 2.7 days after the operation. Three cases of intra-ocular hemorrhages and two of iritis. Discision of capsule done in 28.4% of the cases. Of the recorded ultimate vision, it was 0 in 4.8%. Burnett.

XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

321. Amman. Retinal hemorrhages with disseminate choroiditis. *Inaug. Dissert.*, Zurich, 1896.

322. Bassères. Retinal hemorrhage of malarial origin. *Arch. d'opht.*, xvi., 6, p. 352.

323. DOLGANOFF. On retinal changes in infectious diseases. *Arch. f. Augenh.*, xxxii., iii., p. 261.

324. LODATO. Gummous retinitis premonitory of cerebral syphilis. *Arch. di Ottalm.*

325. WELTERT. A case of "retinitis circinata." *Arch. f. Augenheilk.* (colored plate), xxxii., p. 187.

326. BOCCHI. On a case of retinal tumor. *Ann. di Ottalm.*, xxv., 2–3, p. 204.

327. WINTERSTEINER. On corneal changes in glioma of the retina. *Arch. f. Augenh.*, xxxii., p. 154 (to be translated).

328. SCHÖBL. Cryptoglioma retinæ. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 130.

329. PERGENS. Aneurysmal dilatation of the macular vessels. *Zehender's klin. Monatsbl.*, xxxiv., p. 170.

330. BAQUIS. Clinical study of a case of detachment of the retina in relation to our knowledge of the nutrition of the retina. *Ann. di Ottalm.*, xxv., 2–3, p. 241.

331. SCHNEIDER. On the transmissibility by inheritance of retinitis pigmentosa, with a family history of retinitis pigmentosa in five generations. *Inaug. Dissert.*, Berlin, 1896.

332. SCHTSCHEPOTJEN. On epidemic hemeralopia. *Arch. f. Augenheilk.*, xxxii., p. 194.

333. BULL, OLE. On lunar amblyopia. *Norsk. Mag. f. Læger*, 1896, No. 6, p. 598.

334. STIEL. On periodic disturbances of vision due to opacity of the cornea. *Centralbl. f. prakt. Augenheilk.*, 1896.

335. CRAMER. On unilateral amblyopia peripherica acuta. *Zehender's klin. Monatsbl.*, xxxiv., p. 122.

336. DEMICHÉRI. The field of vision in cases of central scotoma. *Arch. d'opht.*, xvi., 4, p. 226.

337. SALIS. Transient monocular hemianopsia from the use of cocaine. *Ann. d'ocul.*, cxv., p. 285.

338. GOLDZIEHER. A contribution to hemianopsia. *Budapester Königl. Gesellsch. d. Aerzte*, Apr. 11, 1896.

339. PETERS. On the relation between disturbances of orientation and unilateral and bilateral hemianopsia. *Arch. f. Augenheilk*, xxxii., p. 175.

340. ALT. Diabetic retinitis. *Amer. Journ. of Ophth.*, May, 1896.

341. Travis, B. F. Sudden blindness with complete recovery. *Oph. Record*, Apr., 1896.

342. Fridenberg. A case of binasal hemianaposia following cranial traumatism. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1896.

Bassères (322) reports twelve cases of retinal hemorrhage in malaria patients in the Madagascar campaign. These hemorrhages are frequent in regions in which malaria assumes severe forms, and complaints of disturbance of vision are numerous. The hemorrhages are the direct consequence of the general disease, since albuminuria and heart lesions are not found. The hemorrhages appear either in the attack or in the cachectic stage. They are mostly in the nerve-fibre layer about the disc and macula, and usually occur in both eyes. The eyes recover perfectly when the malaria is cured. The author believes the hemorrhages to be due to the formation of parasitic thromboses or to changes in the vessel walls. v. Mittelstädt.

Dolganoff (323) reports on the ocular condition of animals infected by subcutaneous injections of an emulsion of staphylococcus aureus. He found: 1. Imbibition of the optic nerve with white blood-corpuscles. 2. Alteration of the vessels (vacuoles in the endothelial cells and plugs stopping the lumen of the vessels. 3. Œdema of almost all the layers of the retina and degeneration of the ganglion cells. 4. An albuminous exudation and homogeneous masses among the nerve fibres. 5. Destruction of the elements of the layer of rods and cones in consequence of the pressure of an inflammatory exudation. 7. An increase in the number of fibres in the vitreous.

Lodato's (324) patient was a woman of thirty, with syphilis, who had suffered from orbital periostitis causing exophthalmus. On examining her eyes he found about the blurred optic disc the yellowish white spots, as large as a millet seed, which Oswald has described as forerunners of syphilitic brain disease. This view was confirmed in this case. Shortly after, the exophthalmus increased, the lids were swollen, and a corneal ulcer developed. There were also giddiness, epileptiform convulsions and vomiting, and the pain extended over the entire head. The usual antisyphilitic treatment was useless, probably because improperly carried out. Intravenous injections of sublimate were then employed, and six of them sufficed to bring the affection under control. All the symptoms disappeared, and the resulting vision was $\frac{2}{3}$. Dantone.

The retinal tumor described by Bocchi (326) differed considerably in structure from the usual glioma. Masses of spindle cells, with a large nucleus and little protoplasm, were arranged concentrically about the blood-vessels, having apparently arisen from the vessel walls. Farther from the vessels were groups of lymphoid cells. The author therefore classifies this tumor as a perivascular lymphosarcoma of the retina. The choroid was completely atrophic and the retina totally detached.

Dantone.

Schöbl (328) designates by the term cryptoglioma such cases as are really glioma, but in which the clinician is unable to make a correct diagnosis. It is the opposite condition to pseudo-glioma in which one of several less important conditions is mistaken for true glioma. The main difficulty in diagnosing glioma is when, in the second or inflammatory stage, instead of glaucoma, iridocyclitis comes on, leading to transient phthisis. The cases reported by Schöbl are classic. In one case he diagnosed iridochoroiditis purulenta partialis chronica tuberculosa oculi dextri and granuloma tuberculosum corp. ciliar. penetrans in cameram anter. oculi sinistri, and nevertheless the case proved to be one of glioma. From his extensive experience, Schöbl comes to the conclusion that in the development of cryptoglioma two factors work together, viz., an indirect inflammatory process of the uveal tract and a special inclination of the neoplasm to early and extensive metamorphosis. The chief clinical pictures that cryptoglioma simulates are three : (1) plastic iridocyclitis, with occlusion of the pupil ; (2) chronic panophthalmitis ; and (3) tuberculosis of the ciliary body or choroid.

Pergens's (329) patient was blind, with chalky-white, sharply outlined optic discs. In the yellow-colored region, corresponding to the distribution of the macular bundle, there were a number of aneurysmic dilated vessels. No light was thrown on this condition by the history.

Baquis's (330) patient, a young man who had already lost one eye from iridocyclitis, consulted him for a traumatic detachment of the retina in the other eye, which was myopic. The retina was detached on the temporal side from the ora serrata nearly to the disc, and was so folded that, to some extent, it overlay the nasal half of the retina. Two weeks later the retina again lay in position, and the patient could see as well as before. Two days after this the detachment recurred and remained permanently. It was now found that objects in the remaining temporal field were constantly projected by the patient into the nasal field; thus the spokes of a turning wheel were seen by the patient as if moving in the opposite direction. Other details of this remarkable case must be seen in the original paper. DANTONE.

SCHNEIDER (331) gives a brief résumé of the important papers on the nature and etiology of retinitis pigmentosa. As proof of the hereditary nature of the disease, he reports the case of a family in which five generations were affected.

A sailor of twenty-six, who had previously enjoyed good sight, six years ago slept with two companions on the deck of a ship off the coast of Honduras in the bright moonlight. When they awoke all had great difficulty in seeing, and this condition lasted unchanged for two months. He then separated from his companions, whom he lost sight of. Cod liver oil was ordered by a physician, and under its use his sight improved. When examined by OLE BULL (333) he had a slight conjunctivitis, no signs of iritis, and responsive pupils. Over the entire visible surface of both lenses were scattered numbers of small bluish spots. When the pupil was dilated the periphery of the lens was found to be clear. $V = \frac{4}{18}$. Color sense reduced one half. Visual field normal. The diminished vision seemed to be due solely to the changes in the lenses. The moonlight was regarded as the cause of the affection. Similar cases have not been described. Moon blindness is mentioned by Stellwag. Demours stated that naval physicians were familiar with the fact that sailors who sleep on deck at night frequently become affected with hemeralopia.

STIEL (334) reports the case of a patient with a slight macula over the pupil, who complained at times that objects appeared blurred, and that he then had diplopia, dizziness and headache.

CRAMER (335) found acute peripheric amblyopia in a man of sixty-five, who complained of cloudiness of vision and of seeing phosphorescent images. The concentrically contracted visual field showed an absolute defect outward of 15–25°, within which was a relative defect of about 10°. Recovery under the use of foot baths and iodide of potassium. As Masselon stated, as long ago as 1872, there is frequently in toxic amblyopia not only a central but also a peripheric scotoma, which is usually located in the upper field.

DEMICHÉRI (336) by several observations confirmed the fact that peripheric defects in the field may often be found with retrobulbar neuritis. The scotoma usually shows itself as an incurving of the upper limit of the field, which in rare cases may extend downward until the peripheric defect meets the central defect. The peripheric defect is, however, always a relative one, and is thus distinguished from the usual sector-formed absolute defect. This peripheric defect occurs both in toxic amblyopia and in retrobulbar neuritis of other origins. v. MITTELSTÄDT.

GOLDZIEHER (338) reports three cases of temporal hemianopsia. The causes were thought to be, respectively, a tumor of the hypophysis cerebri, an aneurysmal dilatation of a vessel running in the middle line of the chiasm, and an exudation about the chiasm. In this last case the right temporal field was wanting, and in the left temporal field there was total color blindness with a complete field for white.

In PETERS'S (339) case a man of sixty-eight, after a sudden attack of homonymous hemianopsia, showed those disturbances of orientation that were first described by Förster. The patient was kept under observation for a long time. At the autopsy foci of softening were found in the medullary layer of both occipital lobes, with which corresponded the visual field late in life, but the external cortical portions of the occipital lobes were healthy. The common view that these disturbances of orientation have their seat in the cortical layer must therefore be given up. In unilateral (homonymous) hemianopsia the other hemisphere is supposed to assume this function, but in this case nothing of this sort was noticed. The correct explanation seems to Peters to be that the seat of the disturbance is a lesion of no great extent lying in the association tracts which run in the middle line. These tracts transmit the single visual impressions of other portions of the brain which are combined to produce the "optic series," projections in space, groupings, and consequently orientation.

ALT (340) reports three cases of retinal changes in diabetic patients. In the first, there was much swelling of the disc with whitish exudation extending to the macula region. In the second, there were only shiny ivory-colored round spots in the macula and around it. In the third, there were innumerable punctiform hemorrhages all over the retina of the left eye and at the periphery of the right. BURNETT.

In the case reported by TRAVIS (341), a man of thirty, in perfect health, noticed that his left eye was poor for some weeks. Suddenly he became totally blind in both. There was not even perception of light. Still the pupils were said to be small and responsive to light. Ophthalmoscopic examination revealed a narrowing in the calibre of both arteries and veins, and the next day the retina had a milky white appearance. Three days later vision returned with excruciating pain in the depth of the orbit. Perfect in the right and $\frac{20}{100}$ in the left. BURNETT.

FRIDENBERG (342) reports a case of binasal hemianopsia which followed a blow on the top of the head not accompanied by unconsciousness. The eye trouble, it appears, came on gradually. The dividing line ran slightly to the nasal side of the point of fixation in both. Both discs were grayish white, and the vessels were contracted in diameter. There was red-green blindness. Pot. iodide was given in increasing doses, but with no effect. Some cases from other sources are also recorded in more or less detail. BURNETT.

XIX.—OPTIC NERVE.

343. SHANNON, J. R. Acute vision with choked discs. *Manhattan Eye and Ear Hosp. Report*, Jan., 1896.

Shannon reports a case of pronounced choked discs in a girl of fourteen with normal vision, with no change for about a year, during which she was under observation. From the symptoms—headaches, nausea, vomiting, and dizziness—there was likely an intracranial tumor. She died with symptoms of meningitis. No autopsy. BURNETT.

XX.—INJURIES. FOREIGN BODIES (PARASITES).

344. HILLEMANNS. On injuries of the eye. 2nd part. *Arch. f. Augenheilk.*, xxxii., 3, p. 198.

345. KRIENES. A contribution to the injuries of the eye. *Festschrift z. F. d.* 100-*jährigen Stiftungsfestes d. militär-ärztlichen Bildungsanstalten zu Berlin.* Hirschwald, 1896.

346. OVIO. On the penetration of shot into the eyeball. *Ann. di Ottalm.*, xxv., 1, p. 68.

347. BUSINELLI. On peripheric detachment of the iris. *Clinica moderna*, vol. ii., 1.

348. SCHIÖTZ. A foreign body in the eye. *Norsk. Mag. f. Laegenids Forhandl.*, 1896, p. 224.

349. HEIDENREICH. A cast of the cornea. *Ibid.*, p. 55

350. TORNATOLA. On injuries of the eye, caused by fire-arms. *Arch. di Ottalm.*, iii., 11–12, p. 350.

351. HIRSCHBERG. On magnet operations (with the presentation of a patient). *Berliner med. Gesellschaft*, June 3, 1896.

352. FROMAGET. A vegetable foreign body in the eye simulating a malignant tumor. *Gaz. hébdom. des sciences méd. de Bordeaux*, 1896, p. 56.

353. VARESE. A case of ocular paralysis from auto-intoxication by worms. *Arch. di Ottalm.*, iii., 9–10, p. 309.

HILLEMANNS (344) reports two cases of foreign body in the optic nerve, and a case of gun-cap injury in which later a peculiar copper deposit formed on the anterior capsule. Vision was normal, the piece of cap lying in the fundus.

KRIENES (345) records cases of traumatic cyclitis (spasm of accommodation, hypertony and glaucoma, glaucoma after discission of secondary cataract), of traumatic anterior capsular cataract, of traumatic anterior cortical cataract, and of traumatic insufficiency of the pupil.

OVIO (346), having observed a case in which a shot remained three months in the eye without causing irritation, in spite of the fact that an operation had been done for the traumatic cataract, was led to make experiments in the matter of shot injuries, and he found that the discharge rendered the shot completely aseptic, except when they had previously been brought into contact with spores of splenic fever. Ordinary shot, disinfected with boiling water, caused no inflammation when brought into the anterior chamber or vitreous of rabbits. The author has never seen shot become encapsulated. DANTONE.

After a severe contusion of the eye, the anterior chamber in BUSINELLI'S (347) patient became filled with blood. After absorption of the blood the iris was found to have disappeared completely, no trace of it being found. The lens and the fundus were however intact, and when provided with a stenoptic slit the patient could see as well with this eye as with the other.

DANTONE.

In a peasant of forty-nine, SCHIÖTZ (348) found the upper half of the conjunctiva as empty as after enucleation, but the lower half was occupied by a black, oblique-lying mass resembling a tumor. The patient stated that thirty-three years before a piece of white-hot iron as large as a coffee grain had flown into the left eye. Eight weeks later he was able to resume work, but the left eye was blind, shrunken, and without a cornea. Recently there have been periodic attacks of pain and mucous discharge. The black mass was found to be metallic and when removed with forceps proved to be a piece of iron considerably oxidized, 2.2 *cm* long, 1 *cm* in greatest breadth, and 8 *mm* high. In the depth of the conjunctival sac lay a small mass having a fistulous opening bordered with pigment, which probably represented the eyeball which had become shrunken after extruding the piece of iron.

HEIDENREICH'S (349) patient, a boy of ten, poured melted tin into the barrel of a toy cannon. There was probably powder in the barrel and an explosion occurred in the boy's face. Small burns and excoriations were found on the cheeks and eyelids, and the entire left cornea was covered with a bright plate of metal, which was removed, when the cornea was found to have suffered only a slight loss of epithelium. Ten days later the cornea was clear and the eye normal.

In 21 cases of perforating shot wounds of the eye, TORNATOLA (350) has seen sympathetic ophthalmia only once. This he thinks due to the antiseptic treatment of the small wound and to the fact that shot fired from a gun are aseptic, although shot as found in the shops are always infected with microbes, and frequently the author was able to obtain from them cultures of the staphylococcus albus. In experimental shot wounds in the eyes of rabbits and guinea-pigs, the eyes retained their form and tension in 8 cases out of 10 when the eye had been disinfected before the injury, and the wound subsequently treated antiseptically. But of 20 eyes similarly injured when no such treatment was instituted, 14 became phthisical from iridochoroiditis, 5 suppurated, and but 1 retained its normal appearance. DANTONE.

HIRSCHBERG (351), who introduced his electromagnet in 1879, spoke of the good results obtained with this instrument. In 14 cases out of 15 he was successful in removing the splinter of iron. In the first ten years of his practice, before the magnet came into use, he had not seen a single favorable outcome in a case of iron splinter in the vitreous, while now he has 13 cases, some of them with normal vision. After citing several cases he concluded by stating that he preferred his magnet to the giant magnet, the use of which had been followed by some bad results; he conceded, however, that in some cases the larger magnet might do better service, and that the indications must be carefully considered in each individual case.

Fromaget (352) reports the case of a child of ten brought to his clinic for complete blindness of the right eye and inflammation. Examination revealed a total detachment of the retina and secondary increase in tension. The diagnosis of intra-ocular tumor was made and the eye was enucleated. There was then found a purulent focus in the choroid, in the centre of which was the thorn of a rose. Sulzer.

Varese (353) saw a paralysis of the sixth nerve, accompanied with headache and vomiting in an otherwise healthy and strong woman of twenty-four. No direct cause could be made out, but since the patient complained of constipation a large dose of calomel was given, and this led to an explanation of the affection by causing several intestinal worms to pass, after which the headache and diplopia disappeared. The author regards the affection as being due to an auto-intoxication from the excrements of the worms and their influence on the contents of the intestines, which from the slowness of the peristaltic movements underwent chemical degenerations. Dantone.

XXI.—OCULAR DISTURBANCES IN GENERAL DISEASES.

354. Pick. A symptom similar to Graefe's without other signs of tabes. *Prag. med. Wochenschr.*, No. 49, 1895.

355. Koenig. On the condition of the cerebral nerves in infantile cerebral paralysis. *Zeitschr. f. klin. Medicin*, xxx., 3-4.

356. Fernandez, Santos. Tetanus following enucleation of the eyeball. *Rev. génér. d'opht.*, p. 58, 1896.

357. Feilchenfeld. Complete paralysis of accommodation from oyster poisoning. *Zehender's klin. Monatsbl.*, xxxiv., p. 129.

358. Marina. On multiple ocular-muscle paralyses and their relation to the affections, chiefly nervous, producing them. Deutike, Leipsic-Vienna.

359. Grocz. The ocular symptoms of tabes. *K. aerztlicher Verein in Budapest Sgemészot*, No. 2, 1896.

360. Galezowski. On syphilitic ocular heredity in the second generation. *Rec. d'opht.*, 1896, p. 1.

361. Skladny. On the development of smooth atrophy of the base of the tongue in consequence of hereditary syphilis. *Inaug. Dissert.*, Berlin, 1896.

362. Novelli. The transitory amaurosis of the albuminuria of pregnancy. *Boll. d'ocul.*, xviii., 4, p. 25.

363. Simi. Infective inflammations of the eye. *Ibid.*, p. 28.

364. Angelucci. The surgical treatment and the prognosis of œdema of the optic disc in cerebral affections. *Arch. di Ottalm.*, iii., 9–10, p. 286.

365. Lodato. On softening of the sigmoid gyrus with left-sided ptosis. *Arch. di Ottalm.*, iii., 9–10, p. 322.

366. Ranney, A. L. The relation between eye strain and epilepsy. *Annals of Oph. and Otol.*, April, 1896.

Pick (354) showed an insane patient with a tonic spasm of the elevators of the lids. In looking downward the upper lid remained behind and was spasmodically drawn upward.

Koenig (355), in his papers, records 72 cases, 17 of which came to autopsy. Of the nerves which chiefly interest the oculist the first is the ocular branch of the facial which was affected in 3 cases. The oculo-motor (simple differences in the size of the pupils with normal reaction being overlooked) was affected 8 times, in 6 the inner branches, in 1 the outer, and in 1 both inner and outer being involved. The 3 cases on which autopsies were made had in general the same macroscopic changes, viz., chronic leptomeningitis, internal hydrocephalus, and ependymitis, a condition macroscopically similar to that found in advanced paralytic dementia, but microscopically different. In 2 of the 8 cases lues was present, which was probably responsible for the paresis of the inner muscles. Strabismus divergens was found twice, convergens once, unilateral paralysis of the abducens 3 times, and bilateral 5 times, no etiological factors being discoverable. The optic nerve was atrophic in 12 cases or 16 %, in 2 the atrophy being unilateral. A particular form of the skull, the sugar-loaf head, was not found in these cases, in which others have reported finding it. The cause of the atrophy is to be sought for in central inflammations which may be intra- or extra-uterine. He concludes with some remarks on pseudo-bulbar paralyses which are found in children.

The bibliography cited by Fernandez (356) shows that tetanus following injury of the eye is not so rare as it is believed to be. In the author's case the eye was enucleated for a sarcoma of the interior. Trismus appeared five days after operation and death followed on the tenth day. Sulzer.

Marina (358) has given us a broadly planned and valuable book of 320 pages, treating in 13 chapters of all the ocular-muscle paralyses in their relation to organic and general diseases.

He records his own observations and those of others in a spirit of judicious criticism. The book is well arranged according to subjects, the paralyses due to tabes, sclerosis, general diseases, etc., being treated of under separate headings.

Galezowski (360) has seen certain eye inflammations such as keratitis and particularly choroiditis, which were altogether similar to the specific inflammation of these tissues, while no other signs of acquired or hereditary syphilis could be discovered. These affections were stationary or were improved by anti-syphilitic treatment. More careful investigation revealed the fact that the parents of the patients had suffered from hereditary syphilis. The case histories recorded show the affections to have been interstitial keratitis and choroiditis with small foci. Sulzer.

Skladny (361) in his paper gives a short account of the signs of hereditary syphilis. Regarding Fournier's doctrine of a lues tarda as probably incorrect, he adds to Hutchinson's triad of symptoms that of smooth atrophy of the base of the tongue.

In a young woman with albuminuria in the fifth to seventh month of pregnancy, Novelli (362) saw blindness come on in both eyes within a few days, with œdema of the discs and hemorrhages. After an induced abortion vision began to return and was fully restored three months later. Dantone.

In the course of an epidemic of mumps in Florence, Simi (363) saw a young man with mumps on the left side develop, after the disappearance of the fever, a bilateral disturbance of vision due to dilatation of the pupils and congestion of the optic discs. All symptoms vanished after a week's treatment with calomel.

Dantone.

Angelucci (364) now gives further accounts of the three patients trephined for choked disc. One of the patients has died since from his brain disease, but as regards the hemorrhages in the optic nerve the results of the operation on this patient as well as of those on the two patients still living, could not have been more favorable, and the author therefore urges that surgical procedures should not be delayed when a degeneration of the optic nerve can be prevented in this way. Even in tumors which cannot be removed and in such as can only be partially extirpated, the operation has a favorable effect upon the general condition and particularly the pathological process in the optic nerves.

Dantone.

Lodato (365) speaks of a case reported by Herter (*Journal of*

Nervous and Mental Diseases, 1895, No. 1) in which a focus of softening 36 *mm* in diameter was found in the region of the angular gyrus, after a ptosis of the opposite side had been observed. The author contends, on the ground of his experiments on dogs, that the peripheric centre for the elevation of the lid lies not in the angular gyrus but in the sigmoid gyrus. Furthermore, injury of the gyrus angularis has been seen repeatedly without any subsequent disturbances in the mobility of the lids. In Herter's case the extension of the focus must have affected the white matter. DANTONE.

RANNEY (366) relates a case of epilepsy (*grand mal*) in a perfectly healthy woman of thirty years, who had been unsuccessfully treated by bromides and animal extracts, but who recovered after a heterophoria (esophoria and hypophoria), which was for the most part latent, had been corrected by numerous tenotomies. There had been no return of seizures one year after they were stopped. BURNETT.

BOOK REVIEWS.

I.—**System of Diseases of the Eye,** by American, British, Dutch, French, German, and Spanish authors. Edited by WILLIAM F. NORRIS, A.M., M.D., and CHARLES A. OLIVER, A.M., M.D., of Philadelphia. Vol. I., Embryology, Anatomy, and Physiology of the Eye, pp. 670, octavo, with twenty-three full-page plates and three hundred and sixty-two text illustrations. Philadelphia: J. B. Lippincott Company, 1897.

This long-expected volume will, in the main, meet the reader's expectations both as regards completeness and freedom from error, and it will be found to be for the most part interesting reading. Indeed, it leaves little to be desired, and adverse criticisms must be mostly trivial.

In a new book naturally the first thing to attract attention is the illustrations, and their degree of originality is apt to be regarded as an indication of the originality or at least of the freshness of the text. For this reason we are sorry to say that the illustrations, taken as a whole, are somewhat disappointing. The majority of them are old, many are not only familiar but are even hackneyed, and several of the latter have been used twice in the volume. Such drawings as those by Leber, Sappey, and Arnold of the blood supply of various parts, and those by Cajal of the retina, are probably not to be improved upon and it is pardonable to use them; but with so great a material to choose from, the selection of a microscopic drawing of the iris (p. 49) exhibiting a layer seven cells deep, designated as the anterior endothelium of the iris, is inexcusable. The original drawings seem to be accurate, but a number of them reveal a lack of the technical skill required to bring out clearly the salient points in the object represented. Thus, for example, of the several illustrations of the choroid none seems altogether adequate. Half-tone reproductions of photomicrographs, which are now so popular but which so rarely elucidate the text, appear but twice, one (p. 430) being much better than the common, and the other being (p. 388) worthless for purposes of illustration.

A few words might here be said in regard to some points in nomenclature. German writers in coining new descriptive terms frequently use colloquial expressions which unfortunately do not always readily suggest an equivalent in another tongue. And to avoid the confusion arising from the awkward and ununiform translation of such terms, some English writers have felt forced to employ the original German words. Thus Minot in his *Embryology* uses " Anlage " and some other such words throughout. But now that Wilder has given us a precise equivalent of " Anlage " in " proton," we may hope to see a little philological ingenuity employed and these German words supplanted. In the present system of diseases of the eye, which must long remain the authoritative treatise in English, the opportunity was presented of editing it with a view to the establishment of a uniform standard of English ophthalmological nomenclature. But unfortunately the term " Randschleier " is repeatedly used in one section of the book (p. 58) and its equivalent " velum confine " in another (p. 384). One writer uses the spelling " chorioid," now becoming popular in Germany because etymologically more correct than " choroid," while the others use the latter spelling. " Threshold of stimulation (Reizschwelle) " appears on page 605, and on page 617 " irritation " is used repeatedly in a translation, the original German term being undoubtedly " Reiz." " Reiz," strictly speaking, means neither stimulation nor irritation, but excitation, and " Reizschwelle " means threshold-excitation, or better, liminal excitation.

In scope and general arrangement the present system greatly resembles the *Handbook* of Graefe-Saemisch, with which it naturally challenges comparison. The chief merit of Graefe-Saemisch, and one which will not be superseded, lies in the fact that many of its authors were original investigators in the matters of which they wrote, and this renders the book authoritative in a degree to which no book more of the nature of a compilation can ever attain. Most of the Graefe-Saemisch articles are in every respect excellent, and some will long remain classic models of this sort of literature ; but parts of the book are undeniably obscure, many more are diffuse, and much of it is tedious and unnecessarily difficult to read. In this respect it may be improved upon.

The present English volume corresponds to volumes I. and II. of the German, and has half the length of the latter. It begins with sixty pages on the development of the eye by the late Prof. Ryder of the University of Pennsylvania. This article contains about fifty illustrations, one of which, a valuable drawing, by the way, is original. This, however, is one more original drawing than appears in the corresponding article in Graefe-Saemisch by Manz. If this article is not so satisfactory as many others in the book it must be remembered that the difficulty of the subject is such that so far no one has been able to write a complete and detailed account of the development of the eye that has not been more or less confusing and incomprehensible. On the whole, the article is good, although it contains some loose statements, and in places it exhibits a lack of precise and orderly arrangement. Under the caption "development of the lens" we look in vain for any account of the capsule of the lens, and its first and only mention is ten pages farther on, under "vitreous humor," where it is stated, without qualification, that the capsule of the lens is a product of the membrana vasculosa lentis. Yet Piersol, in the histological part of the volume (p. 353), discusses both this view and the other, now held by many embryologists, viz., that the capsule of the lens is a cuticular deposit from the ectodermic cells of the lens-sac, he personally favoring the former, and Lang and Collins, in the article on malformations (p. 418), state both views, and personally favor the latter.

After the embryology comes the anatomy—forty pages by Prof. Dwight, of Harvard, on the orbit and appendages of the eye, 108 pages by Prof. Baker, of Georgetown University, on the eyeball and optic nerve, 166 pages by Prof. Piersol, of the University of Pennsylvania, on the microscopic anatomy of the eyeball, and twenty-two pages by Prof. Hill, of Cambridge, Eng., on the anatomy of the intra-cranial portion of the visual apparatus. In Dwight's article, which contains a number of new illustrations, the treatment of the anatomy of the orbit and appendages of the eye is largely topographical. The histology of the lids and lachrymal gland is taken up in this chapter only, and the description is rather meagre as compared with that of the histology of the eyeball. The author always writes to the point. His sentences are short, crisp, and unambiguous, yet so disconnected often that the style grows monotonously choppy. Baker's article on the anatomy of the eyeball is very readable, and the historical footnotes and also the notes on derivations and synonyms are valuable. The article seems unnecessarily long, however, and the author has encroached upon the subject-matter of both the preceding and the succeeding article, thus leading to considerable redundancy both of text and illustration. Piersol's article on the histology of the eyeball is the longest in the volume, the most important, and also the most felicitous in execution, it being written in a scientific style which is as rare as it is admirable, and which cannot be too highly praised. The illustrations are mostly drawings by the author, some of which have appeared in his text-book of histology. Hill's article on the intracranial portion of the visual apparatus is not purely anatomical, but rather such an account as would be found in a text-book of physiology. There is no article in this volume corresponding to the fifty-five pages by Leuckhart in Graefe-Saemisch on the comparative anatomy of the eye.

The next article, consisting of forty pages on the congenital anomalies of the eye by Lang and Treacher Collins, of London, gives the impression, perhaps more than any other in the volume, of being authoritative, the authors having had unusual facilities for studying such cases, and the illustrations being original.

The remaining two hundred pages of the volume are devoted to physiological optics. This subject, which was covered by Aubert alone in Graefe-Saemisch, is here divided among five authors. The dioptrics of the eye and normal color perception, which are of clinical importance, have been written by clinicians in an elementary manner intelligible to the clinician, while the articles on the perception of light by Cattell, on binocular vision, etc., by Brodhun, and on the photo-chemistry of the retina by Mays, will appeal more to the advanced physiologist. It will be noticed that Jackson's dioptrics of the eye comprises only the optical principles necessary to the understanding of refraction, matter which in Graefe-Saemisch appears in a different volume, while Aubert's eighty-five pages on the dioptrics of the eye in Graefe-Saemisch is taken up mostly with demonstrations of the refraction of a series of curved surfaces and their application to the eye. But Aubert took this almost bodily from the Physiological Optics of Helmholtz, who first made the calculations, and who has presented them in the clearest possible manner, and there seems to be no reason why this chapter should be transcribed again.

The article on color perception, consisting of thirty-five pages, by Prof. THOMPSON and Dr. WEILAND, of Philadelphia, although it covers the subject well, still leaves something to be desired both in the selection of the material used and in style of execution, while its tone too often suggests the popular lecture rather than the scientific treatise.

These few points that have been criticised are not to be understood as detracting particularly from the value of the book. As said before, the volume is complete, remarkably free from mistakes, and on the whole satisfactory. If the other volumes of the system prove to be up to the standard of this one, a work will have been accomplished that is worthy of high praise.

W. A. H.

II.—**Cure of Excessive Myopia** (Heilung höchstgradiger Kurzsichtigkeit, etc.). By V. FUKALA, of Vienna. Franz Deuticke, Leipsic and Vienna: 1896.

This monograph of 192 pages with 28 figures in the text is exceedingly instructive and important. It treats of the cure of the highest degrees of myopia (16 D and over) by the removal of the crystalline lens. With this subject the author's name has been pre-eminently connected during the last years. The monograph begins with the history of the subject and discusses the problem exhaustively in every direction. It is divided into two parts, a medical and an optical one.

Excessive nearsightedness being almost blindness, and spectacles affording little relief, has for a long time suggested to the medical mind its cure by the removal of the crystalline lens. HERMANN BOERHAAVE was the first to recognize, in 1746, that elongation of the axis of the eye was the cause of myopia; MORGAGNI was the first to demonstrate it anatomically (1761). AUG. GOTTLIEB RICHTER (Göttingen), 1790, proposed extraction or depression of the lens to cure it. BEER (Vienna), 1817, advised the operation, but, afraid of its difficulty, did not perform it.

In the first half of the nineteenth century a number of renowned surgeons (Froriep, J. René, Guérin, Bonnet, etc.), in the erroneous belief that the elongation of the eyeball was caused by the pressure of the muscles on the globe, performed subconjunctival tenotomies. MOOREN recommended extraction of the transparent lens in 1858, but was opposed by v. Graefe, Donders, and others. His first case was a failure. W. F. Smith, of Chicago, according to C. A. Wood's statement in *Am. Journ. of Ophth.*, 1890, p. 360, removed by flap extraction the transparent lens of a thirty-five-year old myope of 20 D. The result was S $\frac{20}{30}$ three months later.

Fukala's first operation (discission) in 1887 was a success. Soon afterward the removal of the lens for the cure of excessive myopia became generally recognized as a legitimate and useful operation, and has been adopted by many prominent oculists.

Fukala considers the operation indicated for young subjects only, but includes an age of thirty, even forty years. The vision of the eye should be no less than 0.1. "Where J. 1 or 2 is not read fluently near by, an essential advantage is not to be expected from the operation." The accidents are hemorrhage and detachment. The danger is greatest if extraction is done without preliminary discission. Mooren, who extracted without discission, had poor results. Progressive choroidal atrophy is no counter-indication, but requires particular precaution. Some operators confine the operation to one eye. Fukala finds that the patients are much more benefited if both are operated on.

His method is discission with subsequent paracentesis of the cornea or *extraction.* At first he made the discission rather small, now he divides the lens very extensively, in the first operation (p. 48). Extremely seldom he makes a preliminary iridectomy. If after free division of the lens considerable swelling by imbibition occurs, it can be immediately remedied by a paracentesis of of the cornea. In this way the recovery may be complete in four weeks, whereas, with the customary small incisions, five to nine months may be required. He cocainizes the eye, dilates the pupil with atropine before the operation, and uses a narrow Graefe knife for the division of the lens. If the division of the lens does not prove sufficient by one attempt, he removes the knife and reintroduces it at once at another place, thus dividing the lens by several crucial incisions. In some cases the division of the lens has to be repeated two or three times; mostly, however, the breaking up of the lens is soon followed by symptoms of irritation and increase of eyeball tension. Puncture (paracentesis) is then in order, and can be repeated several times, but if the reaction be great, and not relieved by paracentesis, extraction of the broken up and swollen masses should be done by a linear corneal incision with a lance-shaped or a narrow Graefe knife.

Fukala is very enthusiastic of the results of this operation. He considers the operation almost totally safe; detachment of the retina, which has been observed, is not caused by the operation, the progress of the myopia is checked in the great majority of cases, the patients can see without glasses distinctly at the distance of 1′ or 2′, and the visual acuteness in most cases is greater than before. Binocular vision, which was impossible to these patients before, is acquired in most cases, when both eyes have been operated on.

Fukala's operation has been adopted by many oculists: Schweigger, about 100 cases, Pflüger 100, v. Hippel 80, Sattler (Leipzig) 80, Thier (Aix-la-Chapelle) 100, Theo. v. Schröder (Russia) 20, Mooren 20, Horstmann 15, Pergens (Brussels) 14, Haab (Zurich) 22, and many others. Tables of the methods of operation and the results of Schweigger, Pflüger, v. Hippel, and Vossius give a very encouraging picture of the value of this new and already quite popular dealing with the cases of excessive myopia.

The second part of the monograph is an elementary presentation of the dioptrics of the eye, with and without a crystalline lens, of spectacle lenses, in such a manner as is found in many text-books and monographs, all of which more or less leaning on the famous § 9 in Helmholtz's *Physiological Optics.* The presentation of Fukala has particular didactic value, in so far as it is accompanied by a great many practical (school-boy) examples, the solution of which is given in full. The treatise of Fukala deserves and will have an extended circle of readers.

H. K.

III.—ALB. MOOREN, **Die medicinische u. operative Behandlung der Kurzsichtigkeit** (The Medical and Operative Treatment of Myopia). Wiesbaden: Bergmann, 1897.

This well-printed monograph of 135 large-octavo pages belongs to the class of easy professional literature which, in the form of an historical essay, treats of a scientific, practical subject, with a strong personal coloring. The discussion extends over the broad field of the occurrence, causation, and increase of myopia, the artificial ripening of cataract, the extraction of the lens in myopic eyes—of which the author is a warm advocate—the visual results of this operation, the treatment of detachment of the retina, the formation and operative treatment of kerato-conus, and the medical treatment of acquired and complicated myopia. Frequent allusion to the author's personal acquaintance with ALBR. VON GRAEFE, DONDERS, and other representative men arouse the interest of the reader, which, in spite of the prolixity of the style and the somewhat desultory presentation of the subject-matter, is kept alive from beginning to end by the author's uncommonly large experience. Nobody will read a book of Mooren without receiving both enjoyment and instruction.

H. K.

IV.—**Report on the Twenty-fifth Meeting of the Ophthalmological Society at Heidelberg, 1896.** Edited by W. Hess and Theo. Leber (in German). J. F. Bergmann: Wiesbaden, 1897.

The Heidelberg report this time appears in an imposing form, 350 large octavo pages, with three (!) text figures, on good paper. An extended review of the transactions by Greeff and Horstmann being found in an anterior part of this number, we want to draw attention to the first thirty-one pages occupied by the report of the solemn session in which, every ten years, the Graefe Medal is to be handed to the man who, among the living, possesses the greatest merit in the advance of ophthalmology. Ten years previously this prize had been awarded—it was the first time—to Hermann von Helmholtz, this year the honor was adjudged to Theodore Leber. Both the oration of the occasion, by Professor v. Hippel, and the answer by Professor Leber are in contents, style, and propriety laudable examples of eloquence. The subject of von Hippel's oration is a biography of von Graefe, the founder of the Society, supplemented by words of warm acknowledgment of the scientific work of the laureate. Leber, after expressing his thanks for the honor conferred on him, said that, in his opinion, the prize should have been given to Joseph Lister. He then speaks of his own endeavors and labors, dwelling chiefly on the incentive and aid he had received from his teachers Helmholtz, C. Ludwig, Arlt, Donders, Cohnheim, and, above all, Albrecht v. Graefe.

H. K.

V.—Clarence A. Veasey, **Ophthalmic Operations as Practised on Animals' Eyes.** Philadelphia: The Edwards and Docker Co., 1896. $1.

This manual of 99 small-octavo pages, with 56 text-illustrations, most of them from electrotypes furnished by two instrument makers, is printed in extra large type, on heavy paper. Its object is to help "the beginner in making himself acquainted with the technique of the various operative procedures through practice on animals' eyes" put into a mask. The descriptions are short and clear, the operative methods few in number, as it should be for the teaching of beginners. The little volume fulfils its purpose, but to get it up as an *édition de luxe* is preposterous. If the size of the type were reduced one half, and that of the volume one third, the book would be both cheaper and handier, and the student could put it like a note-book into his pocket when he goes to the Dead-House to practise on the cadaver. To practise on the cadaver is essential, and no operative course is half-way complete without it. As far as the book goes it can be trusted and, therefore, recommended.

H. K.

MISCELLANEOUS NOTES.

Prof. Boleslaw Wicherkiewicz, of Posen (Prussia), has been appointed Professor of Ophthalmology at the University of Cracow (Galicia, Austria) to succeed Prof. L. Rydel, deceased. This ophthalmic hospital will pass into the hands of his brother, Dr. Bogdan Wicherkiewicz, of Danzig, Prussia.

Dr. Moritz Schneller, who practised eye surgery in Danzig, Prussia, since 1855, died November 6, 1896. He was a pupil of von Graefe, an esteemed physician, and a distinguished author in his specialty.

Dr. R. Denig, late assistant at the University Eye Clinic in Würzburg, has been appointed Resident Assistant Surgeon at the New York Ophthalmic and Aural Institute.

Dr. Trefontaine, late house surgeon at the New York Eye and Ear Infirmary, has settled in Guadalaxara, Mexico.

Dr. A. Dufour, in Lausanne, has been appointed Lecturer on Ophthalmology.

Dr. Emile Berger, of Paris, has been appointed foreign corresponding member of the Spanish Academy of Medicine.

Ophthalmology at the Jefferson Medical College of Philadelphia. Last year the examination in ophthalmology for the first time was made obligatory and its results were taken into consideration in determining the standing of the candidate for the degree. In the recently inaugurated four-year graded course the members of the graduating class will be required to attend one ophthalmological lecture per week and class sections will attend daily clinics.—*Jour. Am. Med. Asso.*, p. 1247, 1896.

The program of the Ophthalmological Section of the next meeting of the American Medical Association at Philadelphia, June 1st–4th, is very extensive. The meeting of the Association, being its semi-centennial, promises to be of unusual interest.

As in other charitable institutions, there have been arranged EVENING CLINICS AT THE MANHATTAN EYE AND EAR HOSPITAL, New York, from 7.30 to 9 o'clock. They are in charge of the younger members of the medical staff.

THE NERVOUS DEPARTMENT of the MANHATTAN EYE AND EAR HOSPITAL has been abolished. Drs. E. C. Seguin, J. F. Terriberry, and W. M. Leszynky have been elected Consulting Neurologists to the Hospital.

The OPHTHALMIC RECORD, now in its sixth year, has changed its management, and seems to have omitted the otological department. It will appear on the 15th of each month in numbers of about fifty pages. The names of its editorial staff (Geo. E. De Schweinitz, F. C. Hotz, G. C. Savage, H. V. Würdemann, Casey A. Wood, W. E. Hopkins, John E. Weeks, Harold Gifford) guarantee the successful future of the journal. Dr. T. A. Woodruff, 1102 Reliance Building, Chicago, is Editorial Secretary, and L. D. Pierce, 214 S. Clark Street, Chicago, the publisher. Price, $3.00 per annum. The two numbers which thus far have appeared, make a good impression.

The ANNALS OF OPHTHALMOLOGY AND OTOLOGY have been divided into two volumes, one on OPHTHALMOLOGY, appearing on the last of January, April, July, and October, and the other on OTOLOGY, LARYNGOLOGY, AND RHINOLOGY, appearing in February, May, August, and November. Subscription price of OPHTHALMOLOGY, $4.00, of OTOLOGY, $3.00, of both together, $5.00. There will be no other change in the management of this excellent periodical, whose energy in collecting useful information from all available sources is highly commendable.

Contents of the last numbers of the Arch. f. Aug.

Vol. XXXIII., No. 4. Issued October, 1896.

28. G. LINDSAY JOHNSON (London), Observations on the Mac. Lutea. Second part, published in these ARCH., vol. xxv., p. 1, etc.

29. GEO. ABELSDORFF, Prophylaxis of Sympathetic Ophthalmia.

30. H. Krienes, Light and Color Sense in Diseases of the Retina, Choroid, and Optic Nerve. Second part.

31. Horstmann and Greeff, Report on the XXVth Ophthalmological Congress at Heidelberg, held August 5–8, 1896. Translation in this number.

Vol. XXXIV., No. 1, issued December, 1896.

1. F. Dimmer, Some Aids in Ophthalmic Teaching.

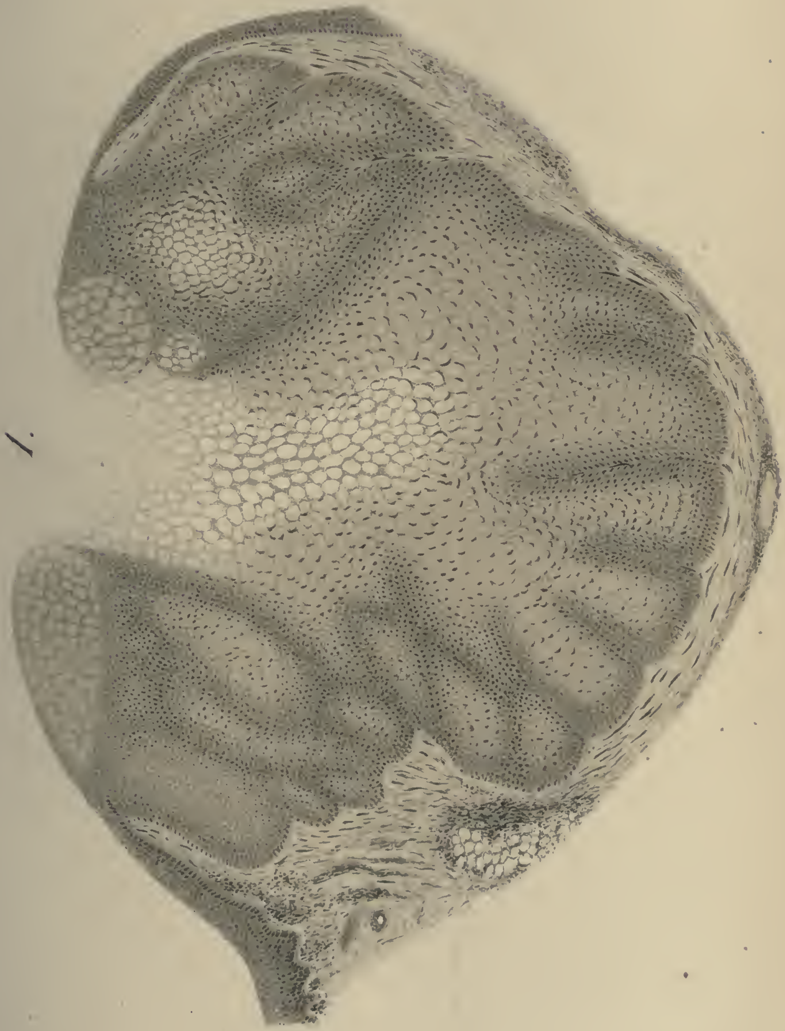
2. P. Silex, Progressive Paralysis of the Levator Palpebræ.

3. E. Procopovici, Congenital Bilateral Paralysis of the Abducens and Facial.

4. R. Denig, Experiments on Contusion of the Retina.

5. Fr. Hosch, Coloboma of Both Optic Nerves.

6. Systematic Report, 2d quarter of 1896. Translation in this number.



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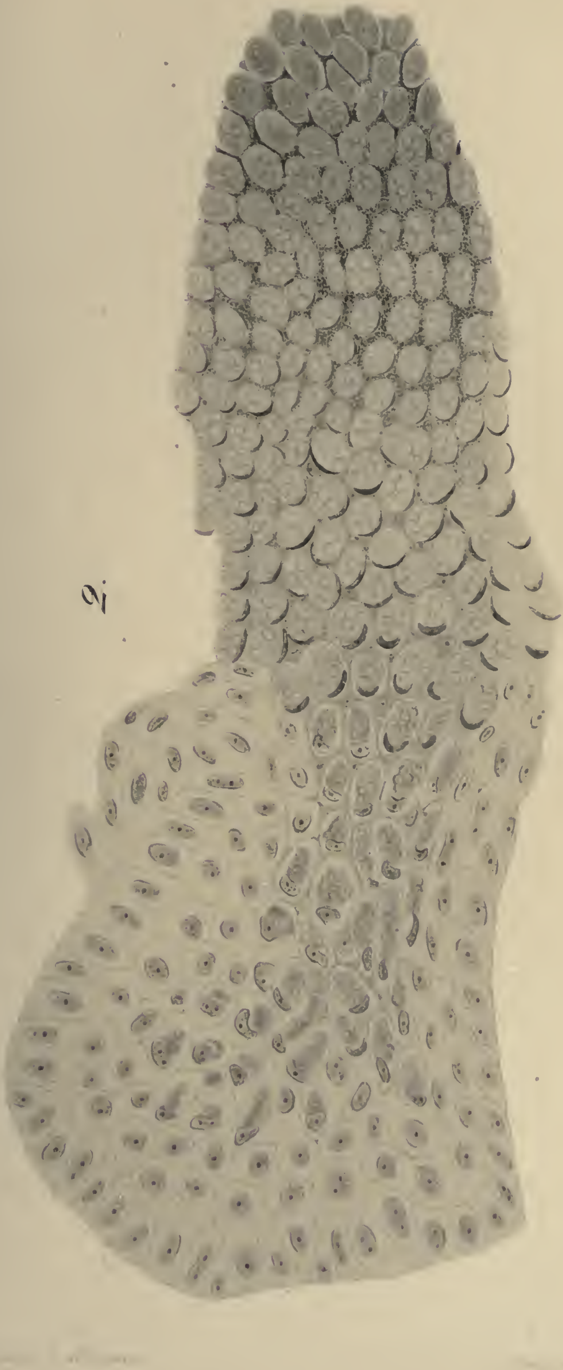
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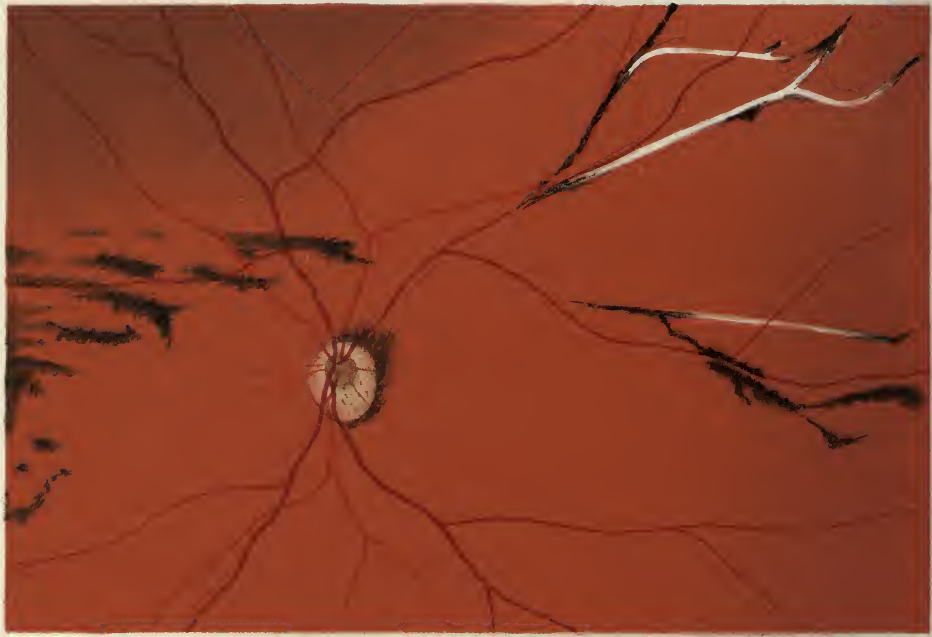

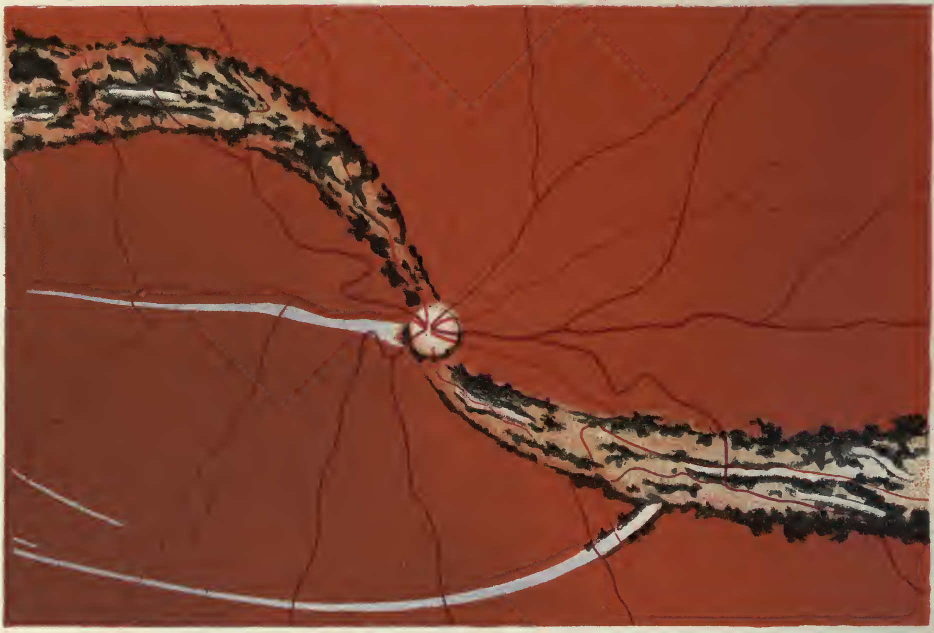

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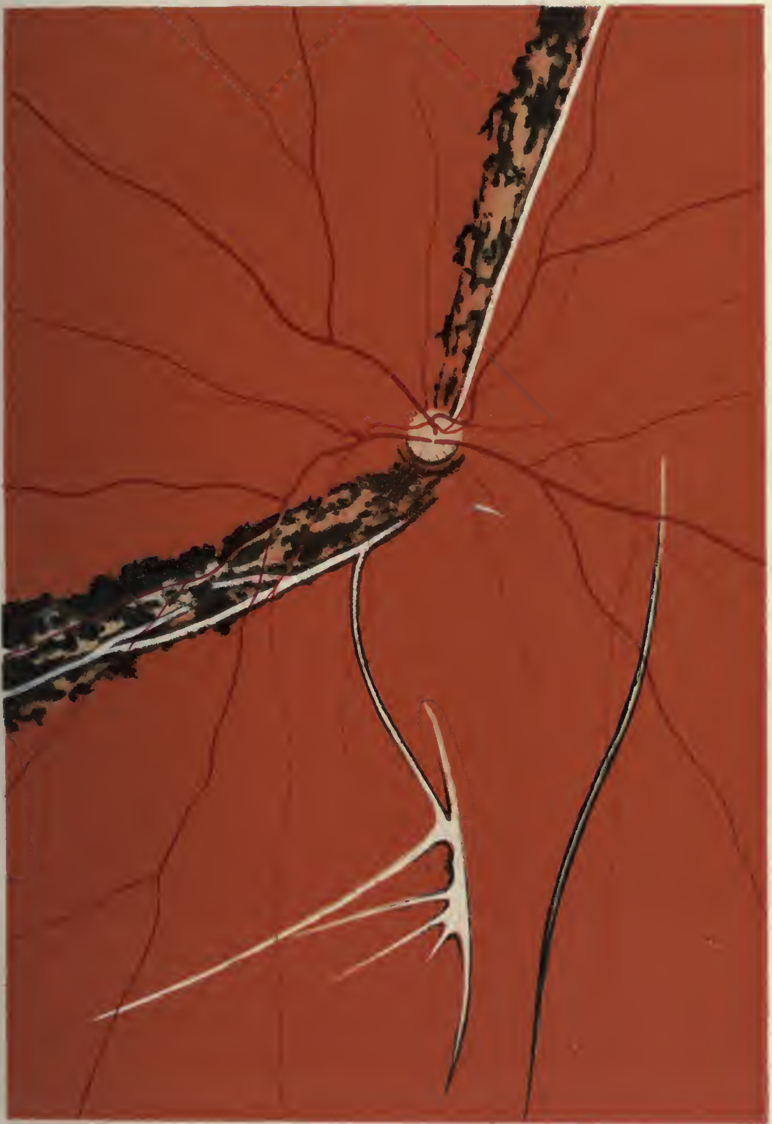

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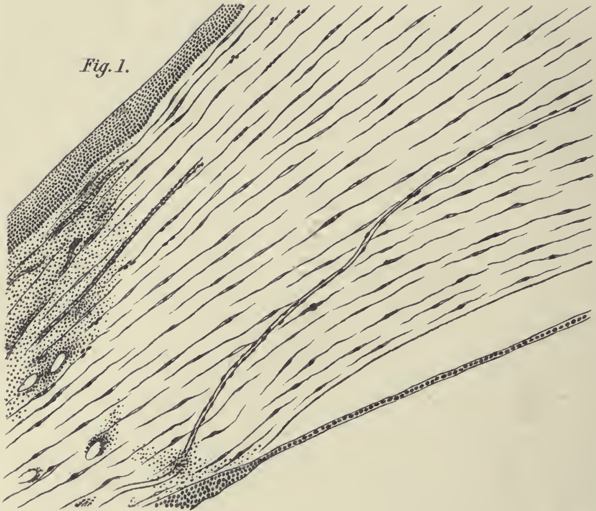

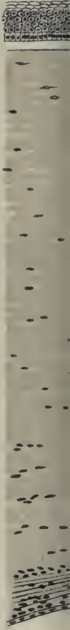

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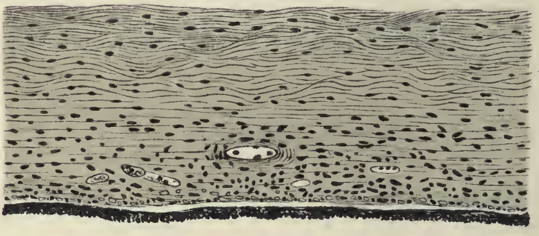

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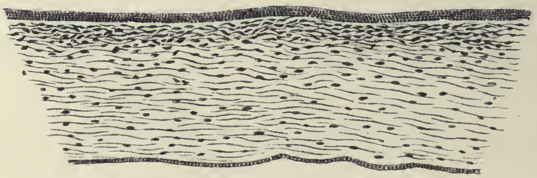

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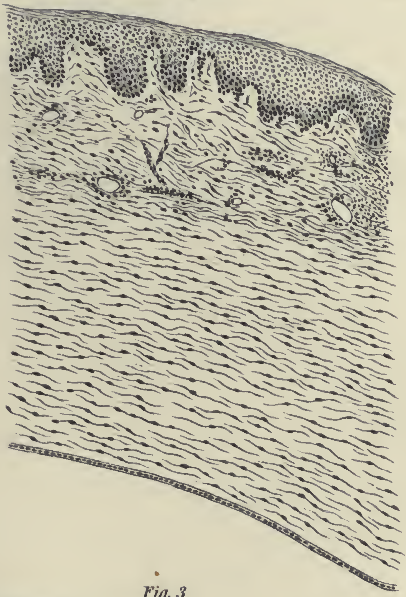

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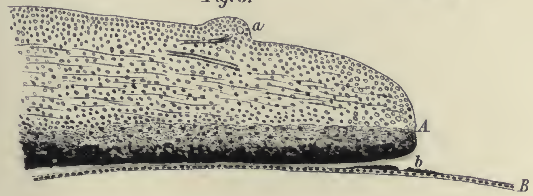

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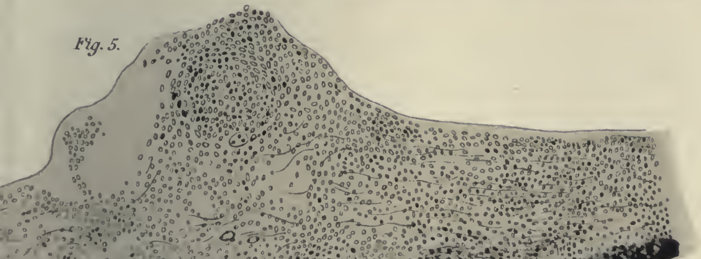

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Lith. Anst. v. C. Kirst, Leipzig

VOL. XXVI. No. 2

ARCHIVES OF OPHTHALMOLOGY.

THE DIRECTIONS OF THE APPARENT VERTICAL AND HORIZONTAL MERIDIANS OF THE RETINA AND THEIR MODIFICATION FROM PHYSIOLOGICAL AND PATHOLOGICAL CAUSES, WITH A DESCRIPTION OF THE CLINOSCOPE.

By GEORGE T. STEVENS, M.D., Ph.D., New York.

(*Four figures in the text.*)

Comparison of Data Regarding Retinal Meridians.—If the point of regard of the two eyes is fixed in the median and in the horizontal plane and at infinite distance, while the head of the observer is in the primary position, it might be assumed that the vertical meridian of each retina would coincide with a plane perpendicular to the plane of regard and that the horizontal meridian would coincide with the plane of regard.

Yet in respect to a proposition so apparently simple and involving questions of great importance, practical as well as theoretical, the views of the ablest investigators have been at variance; for while Helmholtz concedes that the horizontal retinal meridians so nearly coincide with the plane of regard that they may be considered as practically identical with it, he characterizes the vertical meridians as *apparent* vertical meridians, and he reasons from his own experiments, and those of Volkmann, that these apparently vertical meridians as a matter of fact, in normal eyes, converge downward to the extent of 1¼° each, making thus an angle between the vertical meridians of the two eyes of 2½° with the lower extremities of the meridians approaching each other.

Basing his calculations on this proposition and on the law of Listing, Helmholtz deduced his remarkable demonstration of the horopter in its various positions.

Meissner also found a tilting of the apparent vertical meridians, but worked out a different theory of the horopter.

Hering, however, found no convergence of the vertical meridians and of course arrived at a conclusion quite different from that of Helmholtz.

A subject of great physiological interest then has been thrown into confusion by the variation of data from which learned and conscientious investigators have drawn their conclusions. It has become the custom of recent writers to mention the subject of the horopter as one having no physiological value, or even to speak of it with a measure of disdain. The illustrious Helmholtz has been accused of a waste of time on his own part, and a demand for a waste of energy on the part of his disciples in their attempts to follow his analytical reasoning and his abstruse mathematical formulæ.

We shall make no mistake if we regard this subject to which Helmholtz devoted so much time and research as one which, when rightly comprehended, is of weighty interest to the practical ophthalmologist, and that it is by no means a subject of scientific curiosity only.

Leaning of the Vertical Meridians in Paralyses.—There is another field of research in respect to the position of these vertical and horizontal meridians which will perhaps appeal more directly, in the present state of our knowledge, to the practical ophthalmologist, and that is in regard to the degree and direction of their tilting in cases of paralysis or paresis of the motor muscles of the eye. At present, in the diagnosis of paralysis of these muscles, it is customary to observe the fact of the tilting of images, but of the exact extent little or no notice is taken. Although there are means of arriving at a rough estimate of this leaning, I believe that in no textbook on ophthalmology is it recommended to employ even these rude methods.

It may also be a subject of practical interest, indeed in certain cases it is such, to determine the extent of torsion which a patient may be able to induce and especially to determine, as far as possible, the muscles on the action of which the torsion depends. Yet we have no satisfactory and convenient means for determining this torsion, nor have we satisfactory means of developing the control of patients over the function.

We have thus various inducements to a greater facility in the theoretical study and the practical examinations of the relative positions of the vertical and horizontal meridians of the eyes.

The Plane of Regard in Different Individuals.—The question of the normal adjustment of the plane of regard of the individual with respect to the primary position of his own head when the minimum of nervous energy is directed to the muscles of the eyes, has never been taken sufficiently into account in the experiments of those who have interested themselves in the problems of corresponding points of the retinas and of the horopter, yet here is an element of great, in fact of essential, importance in the investigation. Daily experience with the use of the tropometer shows that many persons have the eyes normally so adjusted that in a passive state the plane of regard, the head being in the primary position, would be materially and often excessively above the horizontal plane. It is not unfrequently the case that repeated and well conducted examinations show that the normal deviation above the horizontal plane reaches from 8° to 10° of arc, and in some instances these figures express only a part of the truth. There is another large class of persons who show as clearly that the deviation of the plane of normal direction is materially below the horizontal plane.

It need hardly be said that, in an investigation in which the law of Listing plays the principal rôle, such peculiarities must be taken into consideration, and that, in the absence of a due regard to the normal plane of direction as shown by the tropometer, there can be, as there have been, only confusion and results of uncertain value from the researches of investigators.

The first element of accuracy in these researches then must be a knowledge of the relation of his normal direction of regard to the horizontal plane on the part of the observer.

If an observer should be subject to the condition which I have called anophoria,[1] that is, a condition in which there is a tendency for the eyes when not under the exercise of the will to deviate upwards, and if with this tendency there should be a necessity for slight convergence, then in the primary position the vertical meridians, supposing them to be vertical, should, according to the law of Listing, take substantially the position which was recognized by Volkmann and Helmholtz.

Should the observer, on the other hand, be subject to the opposite condition, should the normal direction be below the horizon, the vertical meridians (still supposing them really vertical) should tilt outwards and downwards; while one who had an adjustment of the eyes for the horizontal plane and with no heterophoria, would, the supposition remaining as above, find no deviation of the meridians in either direction.

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[1] As the terms Anophoria, Anotropia, Katophoria, and Katotropia will appear repeatedly in this discussion, it will be proper to define them. They were first suggested as expressing the conditions referred to in this article in a series of articles commenced in *Annales d'Oculistique*, April, 1895, and concluded in the number for July, 1895.

In those articles it was shown that, irrespective of the condition which had been known as hyperphoria (a tendency of one visual line to rise above the other), there were very many cases in which both eyes were so adjusted that with the minimum of nervous and muscular impulse the visual plane would fall materially below, or rise materially above the plane of the horizon, while the head is exactly in what is known as the primary position.

In moderate cases, in which the tendency of both visual lines is to rise above the plane of the horizon or to sink below it, no deviation of each eye singly upwards or downwards can be detected when a card is slipped before one or the other while the eyes are directed in the horizontal plane. But if the patient is examined by the tropometer the upward rotation of both eyes is found either excessive or deficient. To such cases the terms Anophoria (a tending upwards of both visual lines) and Katophoria (a tending downwards of both visual lines) were applied.

These include by far the greatest number of cases of the class of conditions in which the eyes are not normally adjusted for the horizontal plane.

There is a lesser number of cases in which, if the subject of the examination is caused to look at a distant object in the horizontal plane and a card is slipped in front of either eye, that eye will be seen to rise above the other or to fall below it, giving for the moment a vertical squint, with the covered eye deviating from the line of regard in the vertical direction up or down, and with the deviation of each eye in the same direction. If one eye rises under such circumstances and the other falls there is a different condition, known as Hypertropia, but if each of the two rises or falls as above described, the condition is known as Anotropia (a turning of the visual lines upward) or Katotropia (a turning of the lines downward).

It will be seen that the distinction between Anophoria and Katophoria on the one hand and Anotropia and Katotropia on the other is one of degree rather than one of kind. In the first the eyes can not be seen to deviate up or down, in the last the deviation is plainly seen.

In cases in which the eyes are adjusted for the plane of the horizon, the rotation upwards is about 33° of arc and the downward rotation about 50°. In Anophoria the rotation upward is in excess of 33°, often about 40°, and in Katophoria it is somewhat less than 30°. In the condition of Anotropia the upward rotation often reaches 55° of arc, and I have seen a few cases even more extreme. In these, however, a lateral squint usually results.

Thus it becomes not only possible but quite probable that the conflicting results of the study of the horopter may have been the outcome of the ocular peculiarities of those who have attempted it, and that these peculiarities are such as one accustomed to the use of the tropometer observes daily and which may be accurately determined. They may, therefore, be introduced as elements in the problem.

Requisites for Determining the Position of Meridians.—Passing now to the consideration of the means for determining the position of these meridians, we find from what has preceded that certain requisites are essential. They are:

1st. A knowledge on the part of the observer of the adjustment of his eyes in respect to anophoria or katophoria and a due allowance for the influence of this condition in respect to the direction of the plane of regard in making the experiments.

2d. A means by which the exact position of the head may be known and maintained. The head-rest which I have devised for the tropometer will serve this purpose. By means of this instrument two selected points of the cranium serve as fixed points, so that various observers are enabled to make exactly the same adjustment of the head, an essential condition, but one for which no provision has been previously made.

3d. The blending or the comparison of the images in the field of regard of the two eyes should be accomplished with the lines of regard of *the two eyes parallel.* This cannot be accomplished by the use of the ordinary Brewster's stereoscope, for this demands a distinct convergence of the optic axes. The same is true generally for those who have not exophoria in fixing the eyes in such a way as to blend stereoscopic images without the aid of an instrument. The majority of such persons, when they succeed in blending the stereoscopic images without instrumental aid, do so by converging the eyes to a point one half the distance of the point of regard.

The Clinoscope.—For the accomplishment of all these conditions I have devised the instrument which I am about to describe and which I have called the *Clinoscope*. This instrument appears to meet the demands not only of the physiological investigator in his theoretical researches in respect to the horopter, but supplies a means for practical examinations of the retinal meridians, the necessity for which has not been hitherto felt and for which no provision has been made.

The instrument appears to me to be essential to all the investigations to which I have referred, and by its use we shall, I doubt not, be able to establish such correct data as to enable us to harmonize the conflicting views of the inquirers who have left the subject of the horopter to be regarded, not as a subject of practical importance, which it is, but as an individual peculiarity varying with the experimenter, and therefore of little, if any, physiological interest. By correct methods of examinations into the phenomena the subject may be placed, where Helmholtz believed it should be, on a firm basis of scientific accuracy and uniformity.

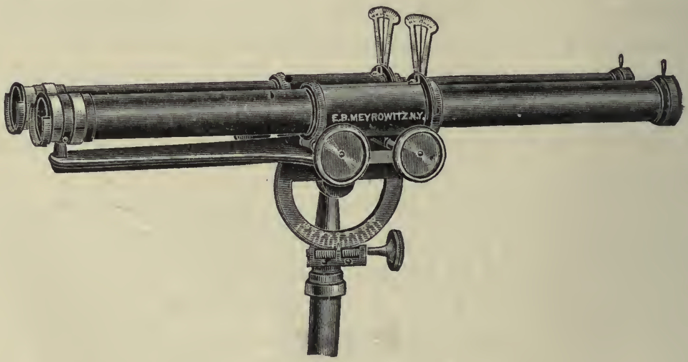
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FIG. 1.

The instrument (Fig. 1) consists of two hollow cylinders, each about 2.50 centimetres in diameter and one half metre in length. The tubes are mounted on a brass platform, which holds them firmly in the same horizontal plane at a distance of 6.50 centimetres between the centres at the fixed points. The attachment to the platform permits the tubes to be adjusted in parallelism, in convergence, or in divergence in the plane of the platform. The platform is attached by a movable joint to the upright standard, so that the instrument may be given any desired dip, and a scale and pointer indicate, as in the case of the clinometer, the dip with respect to the horizon.

The tubes are rotated upon their longitudinal axes by means of thumb-screws, as seen in the figure, and a pointer and scale at the upper side of the tube marks the rotation with accuracy.[1]

At the proximal end of each tube is a clip in which, if desired, the observer may insert a glass for the correction of his refraction or any glass from the trial case.

At the distal end is another clip and provision for maintaining precise positions of the diagrams to be used in the investigation. These diagrams are haploscopic figures calculated to aid in the various experiments which may be made. These may be varied according to the wish of the investigator.

Below are represented two pairs of these diagrams. They are designed on ground-glass, but they may be made on thin paper and applied to glass disks.

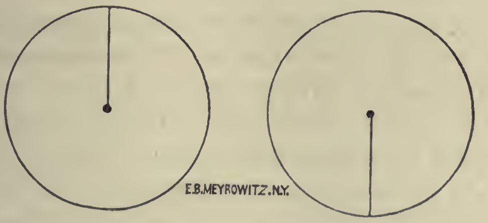

FIG. 2.

Fig. 2 represents two pins, one to be seen by each eye. As the trained observer looks into the tubes the two disks blend and the two pins unite as one long pin, but with the head in the middle of its length. As the upper part of this united image is seen by one eye and the lower part by the other eye, each component of the long pin will appear vertical when that part of the line is brought to coincide with the vertical meridian of the corresponding retina. An adjustment of the tubes by rotation on the long axis will show the true direction of the meridian, vertical or horizontal (depending on the position of the diagrams), of each eye upon the scale above the tubes. Fig. 3 represents another pair of diagrams in which both vertical and horizontal lines are included in the combined figure. In the disks themselves the lines represented here by black dots consist of a series of faint red dots. The perfect union of both the vertical and horizontal lines in a given plane would indicate a corresponding direction of the vertical and horizontal meridians in that plane.

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[1] Since this article was written a form of clinoscope with magnifying lenses, but in other respects the same as here described, has been constructed. The advantages of the lenses, however, are doubtful.

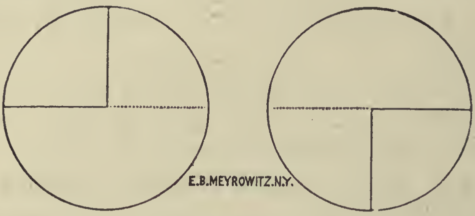

Fig. 3.

By the aid of such figures the trained observer is able to perfectly unite the figures before the two eyes without the aid of convergence or divergence and without the assistance of mirrors or prisms. By means of the adjusting screws experiments may be made with the visual lines directed in the plane of the horizon, above or below it and at any given inclination in these directions. Also in case the observer is exophoric or esophoric, or for other reasons which may occur to him, the tubes may be adjusted in divergence or convergence, and in case of hyperphoria a correcting prism may be placed in a clip next the eye.

All these exact conditions being observed, we may repeat the experiments of Volkmann and Helmholtz in regard to the lines of correspondence with an elimination of the elements of error which were involved in their investigations.

The inquirer, learning from the use of the tropometer the peculiarity of his own adjustments with respect to the horizon, adjusts the dip of the clinoscope to conform to his own normal plane of regard. Suppose that his rotations are found to be for the positive ascensional (upwards) 40° of arc, for the negative ascensional (downwards) 43°. My observations have shown that the positive ascensional rotation should be 33°, and the negative ascensional 50°. This being correct, it is evident that the adjustment of the observer in this case is for a plane 7° above the horizon, and the clinoscope must be correspondingly adjusted while the head is prevented from accommodating itself to this adjustment by being held in place by the tropometer head rest.

Are the Apparent Vertical Meridians really Vertical?—I shall designate the inclinations of the retinal meridians which Helmholtz describes as "converging and descending," etc., as *declinations*, positive (+) and negative (−). These declinations will be recorded on the scales above the tubes, and when the declination is + the pointer will be directed externally to the 0° point, and when − internally to that point. Thus, in case of a result corresponding to the "converging and descending" inclination of the apparent vertical meridian, as found by Volkmann and Helmholtz, the pointers will indicate, Declination, + $1\frac{1}{4}$° each.

In my own case, after a great number of examinations, continued through many years, I have failed to find even a slight degree of esophoria, exophoria, or hyperphoria; and examinations made since the introduction of the tropometer have not shown a material departure from the standard which I have mentioned above. Thus, the experiment in my own case in regard to the direction of the apparent vertical meridians should be conducted with the tubes of the clinoscope directed horizontally, and with the head in the primary position, the glabella and the depression in the superior maxillary bone just below the nose being exactly in a vertical line.

Under these conditions, with the diagrams of Fig. 2 I find no declination of the meridians as shown by the pointers on the scales; indeed, the slightest movement from the 0° mark by either of the pointers is usually instantly detected.

If, on the other hand, the tubes are directed downwards 20°, in order to bring the lines of the two tubes into one line exactly vertical and straight, the pointers may require to be moved slightly out, giving a + declination. The declination is — if the tubes are directed upwards to a corresponding extent. But in either case it is very slight, and sometimes no declination follows the tilting of the tubes. If, however, I produce an artificial hyperphoria, placing a prism of 4° or 5° with its base down before either eye, a declination of the lines at once occurs and to a marked extent.

The principle holds good in cases of persons whose eyes are normally directed above the horizontal plane (anophoria), or below that plane (katophoria). In the first class the declination, if at all manifested when the plane of regard is in the horizontal plane, is + for each eye if the two eyes are similar, but if they differ, the eye which is best adapted to fixation at the distance of the diagrams will sometimes require the pointer of the tube through which that eye sees to be at the 0° mark while the other pointer will register a declination of one or more degrees. A marked condition of hyperphoria will exaggerate the declination according to the rule. If the instrument is inclined to the horizon in conformity with the excess of upward rotation, the registration is either at 0° or more nearly approaching it than when the instrument had no inclination to the horizon. That it sometimes still shows some declination would appear to indicate that the full degree of anophoria or hyperphoria has not been determined and corrected. Corresponding phenomena are observed in katophoria.

When the question of a perfect union of exactly vertical and exactly horizontal lines simultaneously in the clinoscope is investigated, my own observations do not correspond with the results obtained by Helmholtz. In the experiments of Helmholtz, when two horizontal lines blended there was not a blending of lines exactly at right angles to them. Thus it was necessary for him, in order to obtain perfect and simultaneous union, to give to the vertical lines an inclination converging and descending of 1¼° for each eye. In my own case, with the clinoscope the red dots in the diagram Fig. 3 are exactly in the solid horizontal line, while the vertical lines are completely and firmly blended.

A much more difficult test, but one which will be perhaps more satisfactory to one who is skilled in such inquiries, is that of the well known diagram of Helmholtz, which is reproduced here on the diminished scale necessary for use in the clinoscope (Fig. 4).

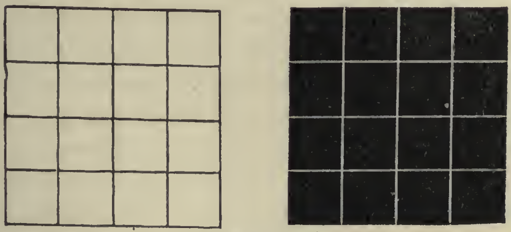

FIG. 4.[1]

On the theory that the horizontal retinal meridians are really horizontal, and that the apparent vertical meridians converge in descending 1¼° each, he constructed this diagram, in which the vertical lines are given, the declination corresponding to the assumed declination of the retinal meridians. In case the vertical meridians actually tilt to the extent of 1¼° each, the vertical and horizontal lines of the two sides of the diagram should blend perfectly and remain blended.

I have never been able under normal conditions to hold both these sets of lines together at the same instant while the plane of regard is horizontal and the figures are at right angles to it; for if the attention is given to uniting the vertical lines the horizontal lines are not perfectly united but have an inclination equal to that overcome for the vertical lines. If the union of the horizontal lines is maintained there is a declination of the vertical lines which separate thus V. This declination is, in the diagrams of the size here represented and at the distance of one half-metre without an instrument or at the distance of the clinoscope when it is used, exactly equal to the diameter of one of the lines, so that, for instance, when the horizontal lines are maintained in exact union, a vertical black line which at its upper extremity is in contact with the white line, and at its right, will at its lower extremity touch the white line but on the left side. Thus the black line crosses from the right side to the left in the distance of the length of the lines. It is also interesting that, although the union of the black and white squares always gives the effect of lustre, no such effect is ever perceived, even at the centre, where the lines are superimposed as the result of the blending of the vertical lines when the horizontal lines are blended.

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[1] Although the engraver has represented these diagrams in quadrilateral form, they should be in circular form similar to Figs. 2 and 3.

I am, however, able to induce a condition with the clinoscope in which a very close approximation to a union, if not an absolute union, of all the lines can be effected. If I place a prism of about 4° with its base down before either eye, thus causing an artificial hyperphoria of about that amount, the images of the tubes separate for a moment but soon unite and when union of the disks is effected the vertical and horizontal lines of the two sides become almost, if not quite blended. In what manner a declination of one set of lines should be induced, while the other set is subject to no change, is not altogether clear, but it is certain that the two sets of lines under these circumstances appear to me to make a more perfect union than when no prism is employed.

A still more perfect blending is effected if the diagram is seen through a stereoscope which is so placed that the plane of regard is downwards 20° and the card on which the diagram is printed is inclined away from the observer, making an angle with the plane of regard of about 120°. Under these circumstances the union is almost complete.

The phenomenon is, in this case, not so difficult to explain, for by the rules of physiological optics the horizontal lines would remain unchanged while the vertical lines would undergo a change of direction and with the required degree of the angle of inclination of the card the union should be accomplished.

This principle can be illustrated by a simple experiment varied from that of Meissner. A fine metallic thread is suspended in a good light with a weight at its lower extremity to hold it tense and vertical. The observer, with his eyes at a distance of one foot from the thread which is in the median plane and with the head in the primary position, looks at the thread at a point exactly on the level with his eyes. The thread will appear single only at the point of direct regard, above and below it will be double, crossing like an X at the point of regard.

If we would unite the thread in its whole extent, the weight may be drawn toward the observer so that the thread no longer extends vertically but with its lower extremity nearest the observer. This experiment might at first appear to oppose the view that in looking down the declination of the vertical meridians is inwards and downwards, for the lines diverge from the centre downwards. But it must be remembered that the right-hand leg of the cross is seen by the left eye and *vice versa*.

Carrying the experiment farther, I find that with the thread at the distance of 15 inches and with the gaze in the usual direction of reading, the thread doubles until its deviation is about 45° with the horizon. Thus it would appear that for eyes adjusted in the position of my own, a book or manuscript should rest at an angle of about 45°. If the page is laid flat on the table the head must be carried forward, or if the page is raised to a position nearly perpendicular with the horizon the book must be raised to the level of the eyes before the confusion is arrested.

As a matter of clinical experience, I find that persons having the condition of anophoria combined with hyperphoria, and especially if with these conditions there is a tendency to exophoria, the vertical meridians have a positive declination of from 1° to 3°. On the other hand, with katophoria and a similar combination of conditions there is a negative declination. In some cases of very considerable hyperphoria the declination reaches a still higher degree.

The Horopter from the Practical Point of View.—The position of the corresponding points of the two retinas being determined, the points in space which may present themselves simultaneously upon these corresponding points of the two retinas may then be also determined. The total of the points upon which images in a given fixed position of the eyes can fall upon corresponding points of the two retinas is called the *horopter.* All objects perceived at these corresponding points are seen single, but objects the images of which fall upon non-corresponding points are seen double. The proportional extent of the field of view in a given position of the eyes in which images are seen singly is less than that in which they are seen doubly, yet it is only when examinations of a critical nature are made that the perception of the double images is recognized.

The horopter resolves itself in all situations not into a large flat or concave field but into lines. In certain situations these lines resolve themselves into a portion of a circle and a straight line. In other situations, with the necessary declinations of the retinal meridians, these lines of the horopter become exceedingly complicated in respect to their direction.

It is not the purpose of this paper to discuss the details of the horopter and especially not to enter upon a solution of its technical situations in the various positions of the plane of regard. It will suffice for our present purpose to point out some of the practical considerations attending this subject.

The position of the horopter of Helmholtz, occupying the ground on which we walk, notwithstanding the opinion of Helmholtz that this would be an extremely favorable position, would in fact be a most unfavorable one; for an individual with the horopter thus located would be forced, in order to obtain clear vision in the path in which he walks, to look directly at the horizon with the head erect. Such an adjustment of the head and eyes would be quite impracticable. In practice, a person having a declination of + 1¼° each eye would find it necessary, when directing the eyes to the ground at 10 or 15 feet in advance of him, to carry the head in front and bend forward in order to avoid too strong a depression of the plane of regard in relation to the head. And this is exactly the position taken in walking of persons who have the condition of anophoria, especially if it is associated with even slight hyperphoria.

On the other hand, those who have unequal katophoria walk with the head tilted back, the chin high in air, in order, doubtless, to adjust the position of the eyes for a horopter lying in the path they are about to tread.

It is not, however, in walking that the position of the horopter is most important. It is at the distance of and in the direction of reading and of work in the position of reading that the most urgent necessity for a favorable position of the horopter may be found. The subject of anophoria, especially of unequal anophoria, one whose eyes are adjusted high and with the complication of hyperphoria, must carry the head far over the page in order that the depression of the plane of regard may be accomplished without the greater contraction of the depressor muscles of the eyes which would be demanded were the head held only slightly inclined.

To such a person, with the head in a position nearly upright, the images of horizontal lines seen by the two eyes would be inclined to cross and thus cause confusion. To avoid such confusion the head must be thrown far forward or an irksome voluntary effort directed to the torsional muscles must be brought to bear.

The position of the horopter is also and in a corresponding manner unfavorably modified in cases in which too great effort is required on the part of the elevator muscles in order to adjust the eyes for a given plane of regard.

The muscles which principally influence torsion are, notwithstanding their comparative size, less able to exercise constant exertion than those which act in a more direct manner upon the vertical and lateral movements. Hence a position of the horopter demanding considerable torsion through the influence of the oblique muscles is a position resulting in fatigue and often in pain and exhaustion.

In the case of one whose eyes are adjusted for the horizontal plane and who has no heterophoria, the horopter, with the head in the primary position and the gaze directed in the horizontal plane, will be in the circle of Müller and in a line which extends from the ground upwards. Practically this may be regarded as a straight line but in fact it is a portion of a circle which cuts the circle of Müller. If the gaze is directed downward, as in walking, with the objective point a few feet in advance, the horopter will be in the position supposed by Helmholtz to be the normal one for the direction of the eyes in the horizontal plane, that is, the ground on which we walk. For in that case there will be a convergence with a depression of the gaze and a resulting rotation on the optic axes and at the distance at which one would usually look in walking, the declination of the retinal meridians would be about 1¼°.

If the eyes are adjusted (as they are in a very large proportion of those having very vertical profiles, an extreme of the condition known to anthropologists as the *orthognathous face*) with the visual lines tending above the horizontal plane, it becomes necessary, or, at least, conducive to the ease of seeing to bend the head forward to a marked extent in order to avoid an excessive action of the depressor muscles and the consequent tilting of the vertical meridians. This tilting if not excessive, and in the case of those who have excellent torsional powers, may be neutralized while the head is carried nearly erect. Yet in extreme cases of anophoria and especially in those cases which reach the condition of anotropia, in which either eye may be seen to deviate upwards if covered, while the other is directed to a distant object in the plane of the horizon, the carriage of the head far in advance and bent downwards is imperative in walking or working. Such exceptions as come within this rule will be mentioned as we proceed.

On the contrary, the chin must be raised in order to locate the horopter along the ground in the case of marked katophoria or katotropia. The facial lines of these katophoric persons are as well marked as those of the anotropic class. With katophoria we find as a rule a " weak " chin and strong facial angles. The profile is more or less that known by anthropologists as *prognathous.*

Exceptions to the general rule for the carriage of the head have been mentioned. These may occur in the condition of anophoria or katophoria. In some conditions of extreme upward tendency of the eyes and especially with more or less exophoria in which there is a marked difference in the upward rotations, on account of the difference of the two eyes in relation to the plane of regard and the tendency to diverge, it becomes more easy in certain positions for these people to adjust for the lower of the two eyes than to correct by torsion the marked declination of the vertical meridians which occurs in certain other relations of the visual axes. Even in these cases the carriage of the head is much of the time characteristic according to the rule. A similar class of reasons sometimes influences the carriage of the head against the usual rule in the condition in which the visual plane is normally depressed.

Torsion and its Psychological Effects.—Movements of the eyes which are habitually associated may, by an effort of the will, be isolated.

When the eyes are turned to one side and upwards or downwards there occurs also an apparent rotation on the optic axes. This peculiar apparent rotation of the eyes is rarely made as an independent movement, for it depends upon the passing of the eyes from one fixed position to another and the consequent change in the relation of the cornea to the cranium. But there is required in directions of the line of regard other than these oblique directions just mentioned an actual turning upon the optic axes. Thus, in directing the gaze upward with much or little convergence or downward with convergence of any degree, this rotation on the optic axis—torsion—occurs.

It is a fact long familiar to students of physiological optics that this power of torsion may be demonstrated in a number of ways, convenient among which is that of uniting two linear figures with the stereoscope and giving to one of them a gradual turn. The images will for a time continue united, but at length, when the rotation of the figure has been carried as far as the rotation of the eyes on the axes can follow, the images will separate. If, while the images of the two sides of the stereoscopic card are held united, but when the parallelism of the vertical and horizontal lines is, to a considerable extent, lost, the observer closes the eyes for a moment and then opens them, the images will be seen double with the vertical lines diverging above or below. After a little, the images may again adjust themselves and complete union may be re-established.

While the rotation thus demanded may be isolated from the movements with which it is usually associated, it is not, under ordinary conditions, possible to isolate the action of a single pair of muscles for its production.

That the oblique muscles play the principal rôle in the act of torsion, under circumstances such as have been mentioned, is unquestioned. They are not, however, the only agents in the rotary movements for the superior and inferior recti lend important aid in the act.

Many well known experiments show that the greater the convergence and the greater the depression of the plane of regard, the greater will be the angle of declination of the retinal meridians. In convergence with depression of the plane of regard, the vertical meridians will converge below, forming an angle thus, V; while in convergence with elevation of the plane of regard, the angle will be reversed, thus, Λ.

These phenomena occur when the eyes are normally approximately adjusted for the horizontal plane without the aid of voluntary effort. In very well marked anophoria or katophoria the results may not be uniform with the rule as just stated.

Under approximately ideal circumstances then, in convergence with depression, the eyes rotate outwards upon the optic axes, while in convergence with elevation they rotate inwards. Supposing the eyes to be absolutely free from the condition of anophoria or katophoria, there should with convergence in the horizontal plane, the head being exactly in the primary position, be no torsion. In most persons, however, there is an inclination, when examining a line of any length, to permit the attention to pass toward the lower part of the line and thus we have reported results, even where there may be no anophoria, which are due to a depression of the plane of regard simultaneously with convergence. With the use of the clinoscope, this error of observation is, of course, eliminated.

The rotation which inclines the upper extremity of the vertical retinal meridian inwards is effected by the superior oblique and the superior rectus, while the inferior oblique and inferior rectus combine their action in tilting the vertical meridians outwards.

It is impossible, while all the muscles are active to determine the proportionate influence of any individual muscle in the act. In the case of paralysis of one of the oblique muscles or of one of the vertically acting recti, a somewhat closer estimate may be made, but even then, while the corresponding muscle of the opposite side remains intact, there is, necessarily, an important element of uncertainty. A complete paralysis of all the oblique muscles, the others retaining their function, or of all the vertically acting recti under corresponding circumstances would be required to eliminate the sources of the error incidental to the question of proportionate influence of each of the muscles concerned in the torsional rotation.

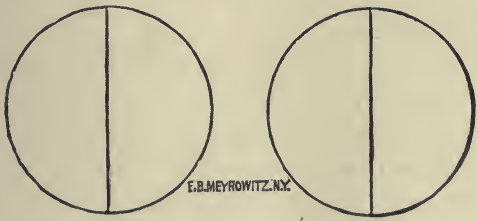


FIG .5.

As to the extent to which torsion can be carried, it is greater in convergence than in parallelism of the eyes. Hence it is greater when the ordinary form of stereoscope is used in its determination than when the images of the two eyes are caused to blend without an instrument, or when some instrument is employed which does not, like the Brewster stereoscope, induce a convergence.

For examination of the power of torsion, the clinoscope affords a means attended with a much greater degree of facility and of accuracy than any which has been suggested. In using the instrument for this purpose, the lines which occupy but half the field of each tube are no longer useful, but straight lines crossing the middle of the field and extending to its extremities (Fig. 5) are required.

If the lines are adjusted vertically and the tubes are then rotated each in the positive direction (upper extremities of the lines outwards), the mental conception of the position of the line formed by the union of the two is modified in an interesting manner. As soon as the tubes are thus rotated outward, the line, so long as it is held as a single line, begins to assume a direction approaching the horizontal. The lower extremity points in toward the observer and the upper extremity outwards from the tube. If the observer has good powers of torsion, the line will at length appear to point almost horizontally directly in and out and to be materially elongated, as though it were an arrow to be shot outwards and slightly upwards.

With a good power of torsion, the lines may be held in union until each of the pointers marks + 11°. Thus between the vertical retinal meridians of the two eyes an angle of 22° with its apex down is formed.

If the rotation is carried in the negative direction, a torsion of about an equal extent or possibly 2° or 3° less is induced, and, in this case, the line assumes again an approximation to the horizontal position, now pointing from within outwards, but outwards and downwards. There is a peculiarity attending this rotation of the eye upon the optic axis which is not found in the other rotations. Let us suppose that we wish to learn, for example, the power of abduction in overcoming a prism with the base out. With the object, the flame of a candle at a distance of twenty feet, a prism of 8° is overcome and the flame seen by each eye blends into one. Now it makes little, if any, difference whether in the experiment we use a prism of 8° before one eye or of 4° before each eye. We cannot exceed the amount of abduction by the use of a prism of 4° before one eye and 5° before the other, any more than we can by replacing an 8° prism before one eye by a prism of 9°.

In the rotation under discussion, however, it is different. If one is able to induce with the clinoscope a torsion of 20° with the two eyes, he cannot, while maintaining the vertical position of one of the lines in the clinoscope, rotate the other to an extent equal to that to which the two were rotated. I find that with one line remaining vertical I can rotate the other either in the positive or negative direction about 14°, which is, however, more than half what I can accomplish with equal rotations of both tubes.

If the right tube remains with the vertical line at 0° and the left tube is caused to rotate outwards, the combined image points outwards, upwards, and to the left. If the left tube is stationary at 0° and the right tube rolls out, the line points outwards, upwards, and to the right.

It is an interesting as well as an important practical fact, and one to which little attention has been given, that horizontal lines can not be held in union while being rotated from the horizontal direction to an extent nearly equal to that in which vertical lines can be held in union. If vertical lines can be held in union with a rotation of 20° or more, horizontal lines become double with a total rotation for both tubes of from 6° to 8°. Indeed, it requires some practice to hold the lines in union with a rotation of each tube either out or in to the extent of 3°.

If the tubes rotate out, the line appears concave, bending outwards at the centre or convex according to the will of the observer. If the rotations are negative the line is convex or concave as before.

Bearing of these Principles on the Horopter.—The fact of the difference in the ability to hold vertical and horizontal lines in union can be seen to constitute an important element in experiments such as those by which Volkmann and Helmholtz investigated the directions of the different retinal meridians. For while there is an imperious necessity for holding the horizontal lines approximately so in order to unite the two images, a very considerable latitude is permitted in respect to the position of the vertical lines, and the torsional act may overcome an important normal deviation.

The principle holds in stereoscopic vision, that the visual recognition of form and of the third dimension is not the direct result of an instantaneous image formed on each retina, but the result directly, or indirectly, of a series of muscular adjustments. That both form and depth may be perceived instantaneously is true, but doubtless in such instantaneous realizations of the actual dimensions of objects there is a mental acceptance of the phenomena which experience has taught to be the result of impressions received upon the two retinas, provided time is allowed for the usual rapid ocular movements.

The fact of difference in torsion for horizontal and vertical lines has its practical application in many directions. A single example may be introduced here as an illustration of this important principle. The question of the form and proportions of printed type, in order to produce the most perfectly legible characters and a page which can be read with greatest ease, has long interested those who are interested in the progress of the art of printing in its relation to the preservation of the functions of the eyes. Experience has, independent of any theory, taught practical men engaged in the art of typography, that the height of letters must be considerably greater than their breadth. In the ordinary type used in America and England the vertical length of all the letters of a line aggregates rather more than thirty millimetres to every twenty millimetres of breadth of letters. In the French typography the height of the letters is still greater. A little examination of different styles of typography will convince a careful investigator that broad, low letters are less easily held in perfect binocular union than the form more nearly approaching the gothic style.

In what precedes I have gone over a number of somewhat closely related subjects more with the view of indicating the directions in which exact investigations are to be made than with the purpose of fully discussing either of the topics introduced. The questions relating to the corresponding points of the retinas have been recognized as fundamental to the solution of the problems of the situations and the character of the horopter. If by the aid of the clinoscope combined with the knowledge gained by the tropometer, we can arrive at a more uniform basis of facts respecting the horopter, much will be accomplished.

The observations of the last two years have led me to assign a most important place to the subject of the horopter. That it is a practical subject, ranking by the side of that of refraction, although a much more difficult and obscure field of research, is a conviction which has grown with every month of investigation since its real meaning, the meaning which could only be revealed by the practical use of the tropometer, has been pressed upon my attention.

This is not the occasion and I do not propose here to review the many directions in which the question of the position of the horopter becomes practical. This is a subject which may become the theme of another paper.

PRIMARY SARCOMA OF THE LACHRYMAL CARUNCLE, WITH THE REPORT OF AN ADDITIONAL CASE.

By C. A. VEASEY, M.D., of Philadelphia.

(*With two plates in the text.*)

PRIMARY sarcoma of the lachrymal caruncle is an affection so seldom seen that a report of the following isolated case requires no apology.

B. R., male, aged twenty-six years, consulted me for a small growth situated upon the lachrymal caruncle of the right eye that he had first noticed seven weeks before. At the time his attention had first been directed to it the size was not greater than that of an ordinary pin's head, but at the time of my examination it had become as large as a small green pea. No symptoms had been occasioned by its presence further than a slight irritation at the inner canthus, causing, at times, moderate lachrymation. The growth was attached by a small pedicle, was somewhat redder than the remaining portion of the caruncle and the surrounding conjunctiva, and according to the patient's statement there had been "scabs on it twice." There seemed to be slight ulceration at the time of the examination, but at no time had there been the least pain. No family history of syphilis, tuberculosis, or growths of any kind could be elicited.

The growth was carefully dissected out and the point of attachment thoroughly cauterized with the actual cautery.

After hardening in Müller's fluid sections were made which, when viewed through the microscope, show the growth to be a non-pigmented sarcoma consisting of large and small round cells, with very little intercellular substance. The ulcerated portion shows very distinctly, and in its immediate neighborhood the mucosa is seen dipping deeply into the growth in a manner not unlike that found in beginning carcinomata. The growth is moderately vascular, the vessel walls being made up of layers of cells, and a few hemorrhages are seen here and there. There is very little pigment found in any of the sections, but all of them show muscle fibres divided transversely and longitudinally.

One year has elapsed since the removal of the growth and there have been no symptoms of recurrence.

In looking over the literature of the subject the following cases have been found.

In 1854 A. von Graefe[1] records a case of "connective-tissue tumor" which had existed one year and had grown to the size of a hazel nut and in which microscopical examination showed symmetrical layers of long and spindle-shaped cells—his description evidently giving it a place among the sarcomata.

In 1873 Gillette[2] reports a case that recurred five times in five years and finally became so large as to interfere with the movements of the eyeball. The right caruncle was the one affected and the growth proved to be a melano-sarcoma.

In 1875 Rydel[3] had a case in which the right caruncle was involved, the growth being about the size of a pea, that proved to be a melano-sarcoma, and notwithstanding the entire removal, it recurred again in the same place in a year's time.

A case was recorded by Del Monte[4] in 1879, the growth occurring in a young child and having been first noticed three or four months before the operation. The right caruncle was the one affected and the tumor was presumed to be due to the use of a strong collyrium. At the time of the operation it was as large as a walnut and by pressure on the eyeball caused the latter to be turned upward and outward and interfered with its movements in every direction. The lids were widely separated and the exposed part of the tumor was more or less rough. The lower and inner third of the cornea was also affected. The tumor was extirpated and was found to have some attachments to the bony wall of the orbit, but the author states there is no doubt of the origin being from the caruncle. The child died four days after the operation. Microscopical examination showed the growth to be a "telangiectatic fibro-sarcoma," composed mostly of small round cells.

The only other case I could find was that of Despagnet.[6] The patient was a female, aged thirty years. The growth had existed for eight months, was attached by a small pedicle to the left caruncle, was shaped like a mushroom and contained numerous lobules. It was of the color of red wine, and the slender pedicle was about 4 *mm* long and the body about 2½ *cm* long by 1½ *cm* broad. The family history was good. The internal part of the eye was inflamed. After removal of the growth the parts were cauterized and microscopical examination showed it to be a non-pigmented sarcoma.

Thus it is seen, there were two cases of non-pigmented sarcoma (Despagnet's and my own), two cases of melanosarcoma (Gillette's and Rydel's), and two cases in which the question of pigment is not referred to (Graefe's and Del Monte's). In four of the cases the right caruncle was the one affected, in one only the left caruncle was the point of selection, and in one the seat of the disease is not stated. Early adult life seems to be the age especially susceptible to the occurrence of the affection, and when once begun the growth is extremely rapid. The attachment of the tumor may be by a slender pedicle, thus, to a certain extent, resembling an ordinary polypus, or by extensive adhesions even reaching into the orbital cavity (Del Monte's case). The color is usually of a deeper red than the surrounding conjunctiva and the size varies from that of a pin's head to that of a walnut, or even larger. They are very prone to recur in, or near, the same place after removal, and the microscopical examinations show that the round and spindle-celled varieties apparently occur with equal frequency. The cause in one case was presumed to be the application of a strong collyrium, but in none of the other cases could any cause be ascribed.

Early and thorough removal of the growth as soon as de-

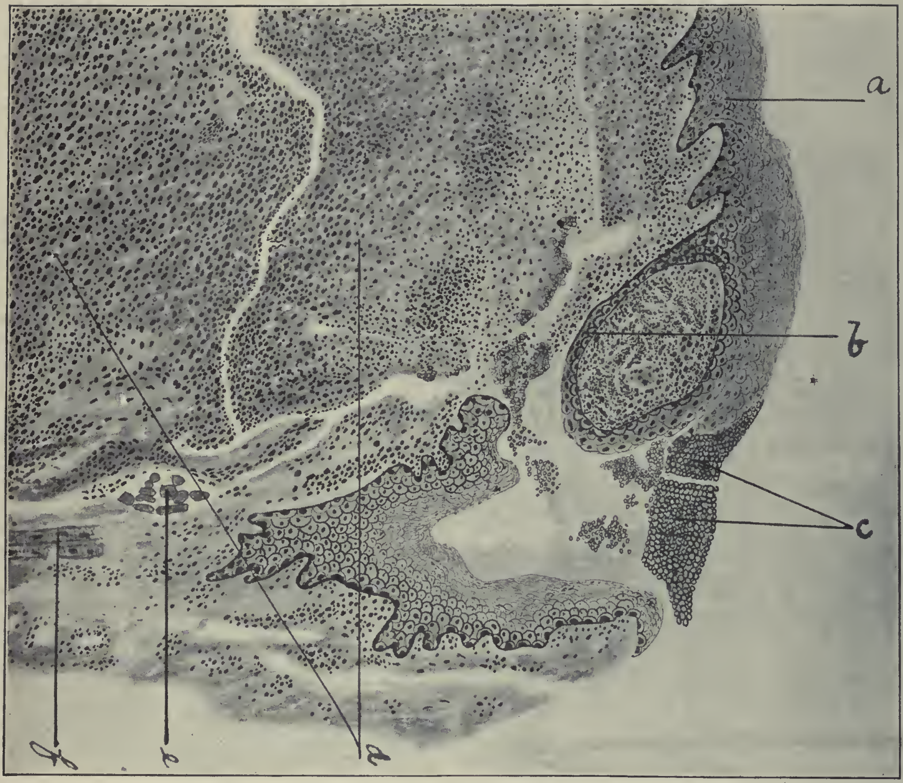


FIG. I.

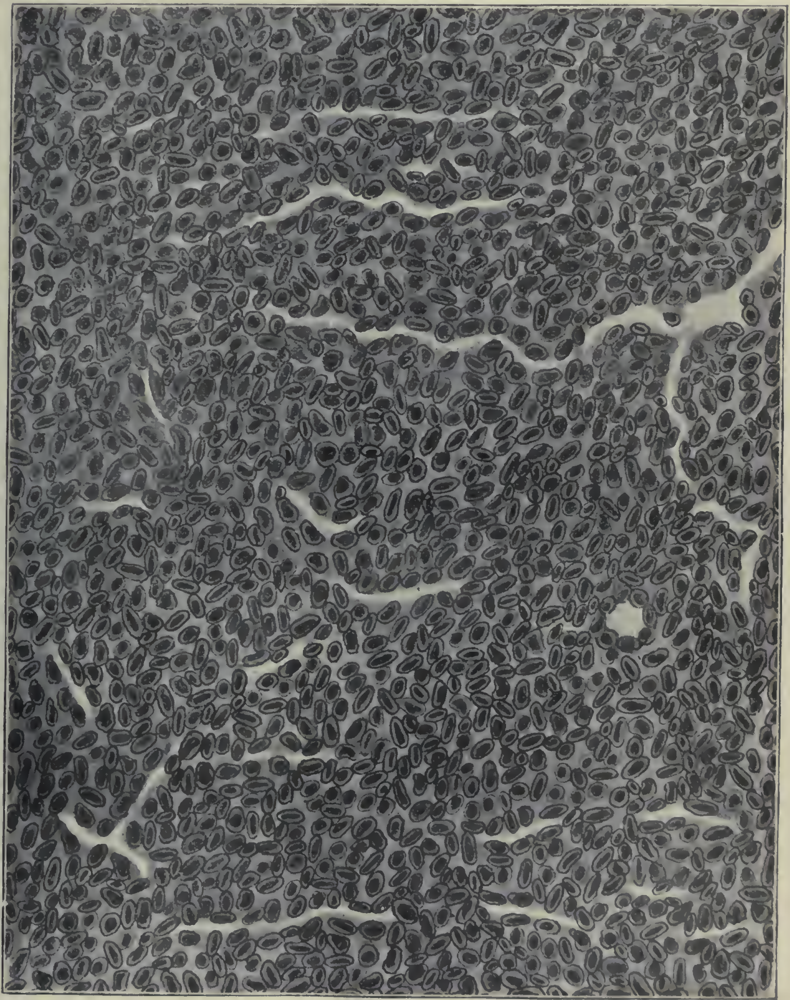


FIG. 2.

tected and, in addition, thorough cauterization of the parts seems to be the best method of treatment.

Explanation of the Plates.

FIG. I.

a. Mucous membrane.
b. Mucosa dipping into the tumor substance as in beginning carcinomata.
c. The ulcerated portion.
d. The body of the tumor.
e. Transverse section of muscle fibres.
f. Horizontal section of muscle fibres.

FIG. 2.

The magnification is higher, showing the cells, and in the outer portion a transverse section of a blood-vessel.

BIBLIOGRAPHY.

1. A. VON GRAEFE : Geschwülste der Thranen karunkel, *Archiv f. Ophthal.*, Berlin, 1854–1855, i., 1, p. 289. One case.

2. GILLETTE : Sarcome melanique récidivant de la caruncule droit. Cinquième récidive. Extirpation du globe oculaire. *L' Union méd.*, Nr. 34. (Quoted in *Nagel's Jahresbericht der Ophthal.*, 1873, p. 252.) One case.

3. RYDEL : Melano-sarcoma carunculæ lachrymalis et conjunctivæ bulbi. *Prze.-glad. lekarski*, Nr. 3. (*Nagel's Jahresbericht der Ophthal.*, 1875, p. 455.) One case.

4. DEL MONTE : Fibro-sarcoma telengettasico della caruncola lagrimale. *Anni di Ottalm.*, Milano, 1879, viii., p. 250. One case.

5. DESPAGNET : Des tumeurs malignes de la caruncle. *Recueil d' Ophtal.*, 1888, p. 33. One case.

6. VEASEY : Primary Sarcoma of the Lachrymal Caruncle, with the Report of an Additional Case. These ARCHIVES, 1897, xxvi., 2, p. 204. One case.

GLAUCOMA AFTER CATARACT OPERATIONS.

By Dr. S. C. AYRES, Cincinnati, Ohio.

(*With two charts.*)

THE interest that has recently developed in the study of glaucoma after cataract operations has prompted me to report the following cases with a few comments:

Case I.—Extraction with Iridectomy in both Eyes, Glaucoma Appearing in the one Eleven (?) Years, in the other Twenty Years, after the Operation. Result: Contraction of Visual Field; Deep Excavation of Discs; Nearly Total Loss of Vision.

J. B., fifty-two years, gave the following history: When twenty-three years of age (1867) his *left* eye was operated on by the late Dr. E. Williams for cataract, and eight years later (1875) the *right* eye was operated on by the writer. The von Graefe method was used in both instances, liberal iridectomies being made. He states that he had good vision in the left eye until about eight years ago, when it began slowly to fail. There was no pain or tenderness of the eye, and as the right eye was good he did not miss its failing vision. The *right eye* began to fail in April, 1895, but was free from pain. He paid no attention to this until his vision became so imperfect that he could no longer see to read or do ordinary farm work. In the right eye the line of incision is distinctly visible. The wound had closed perfectly. The depth of the anterior chamber is normal for an aphakic eye. The coloboma is of good size. There is no incarceration of the iris. Oblique illumination reveals a thin membrane extending over the entire area of the coloboma, with the exception of a portion downward and inward, which is perfectly clear. There is an adhesion between this membrane and the inner limb of the iris. The vitreous is somewhat liquefied. There is a deep excavation of the optic disc. $T + 1$. The field of vision is contracted, as is shown by the chart. $V =$ fingers at 4′.

Left Eye.—There is a liberal iridectomy, but at the inner and outer angles of the incision are cystoid cicatrices. Oblique illumination reveals a membrane extending over the entire area of the coloboma. The optic disc is excavated. T + 1. V = fingers at 6″. The field of vision is shown by the chart. His statement shows that for at least eleven years he had good vision in the left eye, the one first operated on. Then it began gradually to fail, but he could not say definitely how rapidly it failed, as he still had excellent vision in his right eye.

The failure of the right eye is more definite. In the spring of 1895 he noticed he could not see to work as well as usual, but he could still see to read. It was not until the spring of 1896 that he was disabled for work.

It is interesting to observe that the left eye, in which the cystoid cicatrices existed, which are considered safety-valves against increased intra-ocular tension, failed before the right eye where the wound was smooth and solid. Another point of interest is that in the left eye a secondary membrane covered the entire papillary area, whereas in the right one it was not complete. The left eye retained good vision for eleven years after the extraction. The right eye, however, retained very good vision, for he was able to read, for a period of twenty years, before the glaucomatous symptoms began to develop. The ophthalmoscopic appearances of both eyes are just what one sees in ordinary cases of chronic glaucoma. The tension was + 1 in both eyes, and it yielded to eserine, but there was no material improvement in vision.

Case II.—**Compound Extraction; Glaucoma about Two Years after the Operation. Result: Loss of Vision.**

Mr. K., aged sixty-seven, was operated on for senile cataract of the *right* eye in February, 1883. Extraction with iridectomy. There was some inflammation of the wound following the operation, but it soon subsided, and the patient was discharged with V = 0.2. Six months later his vision was the same, and the eye free from irritation. In February, 1884, a year from the time of operation, his glasses were changed and V = 0.1. There was no pain in the eye, and no increased tension was noted, but there was a secondary membrane in the pupil. He was not seen again for about a year and a half, 1885, when he returned with the vision *quite abolished* in this eye. The pupil was dilated, tension +1, optic disc deeply cupped and atrophied. There was a small filament or band extending from the inner portion of the ciliary to the pupillary membrane. But the eye was not painful.

In this case vision fell from 0.2 to 0.1 in a year after the extraction, and in about two years and a half he became quite blind. The loss of vision was like that of simple chronic glaucoma. In June, 1886, I extracted the left lens successfully, and he had good vision to the time of his death.

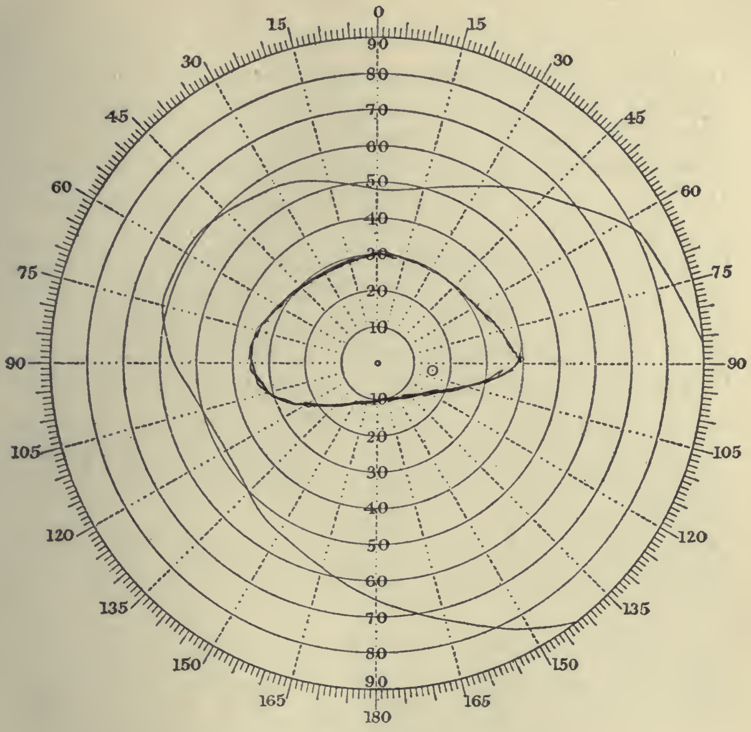
I am indebted to Dr. Geo. H. Goode for this case which occurred in his practice.

CASE III.—A Case of Glaucoma after Cataract Extraction in which a Preliminary Iridectomy had been Performed; Iridectomy Gave no Relief; V=O; Enucleation.

Mrs. E., æt. thirty-eight years. Immature cataract O D and O S. The opacity of the left lens was confined to the periphery. With correction, $-$ 1 D sph., V $= \frac{20}{30}$ O S, and $\frac{20}{200}$ O D.

Preliminary iridectomy was performed on the *right* eye early in July, '95. The cataract having matured, extraction was done in the latter part of the following September. Both operations were performed without any unusual incident. The coloboma was of good size and proper shape, and the wound healed after the iridectomy without incarceration of iris. The lens was extracted without accident, and the wound was free from iris and lens capsule. The eye was examined on the third day, when the wound had closed. The patient complained of nothing that would indicate an unfavorable progress, and she was out of bed at the end of a week. About the tenth day there developed a slight amount of iritis which yielded readily, so that she was able to leave the house and come to my office at the expiration of three weeks after the operation. The eye, then, was free from irritation and with + 9 D sph. V $= \frac{20}{40}$. Three weeks later the same good condition existed. However, about one week after the last visit, or seven weeks after the extraction, the patient began to complain of pain. Examination revealed nothing. There was no injection of the eye-ball, and no alteration in the transparency of the media, so that the optic disc was distinctly visible and there was nothing abnormal in its appearance.

RIGHT.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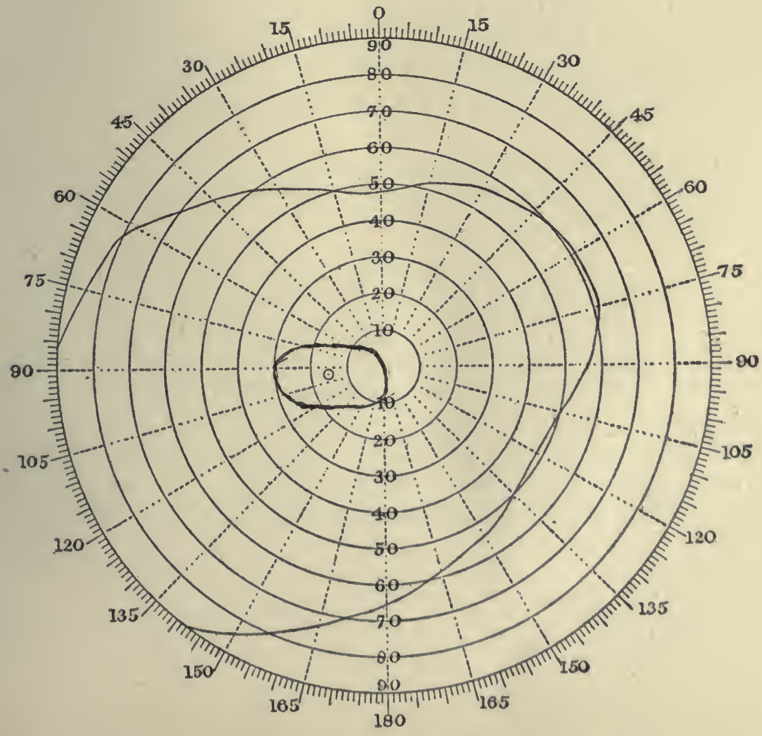
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Tension was not increased. Repeated examinations were made at intervals of five or six days and only upon one occasion was there even a suspicion of an increase in the tension, and a weak solution of eserine was ordered. At the next visit there was an amelioration of symptoms, and fears of glaucoma were dismissed During my absence of three weeks from the city, the eye became more painful, the vision diminished to mere quantitative perception of light, the field of vision was greatly reduced, and tension + 1. With the hope of relieving the pain, an iridectomy downward was made. This effort was not followed by success. Two months later, the eye continuing to be painful and perception of light having disappeared, it was enucleated.

CASE IV.—**Combined Extraction on both Eyes; Acute Glaucoma in one on the Sixth Day; Eserine and Evacuation of Aqueous; Prompt Recovery.**

Mr. M., forty-eight, senile cataract, but eyes otherwise healthy. Both eyes operated upon, an interval of a year intervening. Iridectomies were made in both eyes. About five or six days after the operation on the *left* eye patient complained of pain, and on examination it was found to have plus tension. Atropine had been used. Eserine was ordered, and the next day the wound was opened by a Weber's probe-pointed knife and the aqueous evacuated. This arrested the trouble entirely and the wound healed kindly and he recovered a vision of 0.9. It is now about twelve years since the operation. It seems hardly probable that atropine had any influence in developing an acute glaucoma. There was a liberal iridectomy and the operation uncomplicated.

CASE V.—**Combined Extraction; Glaucoma after Exposure on the Twelfth Day. Four Days later Paracentesis of Cornea, and Eserine; Prompt Recovery.**

Mr. G., sixty-seven, operation for uncomplicated senile cataract. Extraction with iridectomy. Patient remained in hospital a week and then went to stay with some friends two or three days before going home. The operation was smooth, without complication or accident, and he was discharged with V = 0.5. On the journey home he stopped at a station about five miles from his home and drove to his house. It was a cold day and he insisted on going home in a driving snow-storm. The next day he had pain in the eye and his physician wrote me the circumstances

Thinking he had iritis, I advised the use of atropine. Fortunately, I saw him three or four days later and found the ball hard, pupil dilated, cornea cloudy, and vision very much impaired. I immediately made a paracentesis of the cornea and ordered eserine. The glacomatous symptoms subsided and did not return, and he recovered useful vision.

The last two cases may be properly called acute secondary glaucoma, coming on within a few days after operation. In No. 4 it is possible some soft lens substance still remained which swelled sufficiently to excite pain and increase the intra-ocular tension. The rapid subsidence of all unfavorable symptoms and the preservation of excellent vision would rather confirm this theory. In No. 5 the pain in the eye followed exposure to a severe snow-storm about two weeks after the operation. A paracentesis of the cornea was made and eserine used, and this was followed by a subsidence of all the unfavorable symptoms and preservation of useful vision.

In the other cases we have glaucoma coming on in No. 1 in left eye eleven and in the right eye twenty years after operation, in case No. 2 about two years, and in case No. 3 about two months after *successful* cataract extractions.

ISOLATED RUPTURES OF IRIS AND CHOROID.

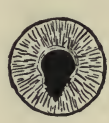
By Dr. JOHN F. WOODWARD, Norfolk, Va.,

LATE ADJUNCT PROFESSOR EYE, EAR, AND THROAT, UNIVERSITY COLLEGE OF MEDICINE, RICHMOND, VA.

(*With a figure.*)

Mr. J. T., of Southampton County, Virginia, aged thirty, white, healthy, robust, good family history, called at my office, November 10th, to consult me about his eye. The following history was obtained: About two months previous, while driving some cattle through a forest, he was struck in the right eye by a stick or limb. The blow was sufficient to stun him, and on recovering he found that he was blind in his right eye. Thinking this would pass off in a short time, and there being no other discomfort to call his attention to a closer examination, he proceeded with his usual duties. After getting home, however, and finding that his sight did not return, he consulted a doctor in the neighborhood, who gave him some simple eye wash, telling him that his eye would soon be all right.

Status præsens: No external signs of a surgical lesion having occurred, the cornea and conjunctiva were perfectly healthy, but there was a semi-dilatation of the iris. Examination with oblique illumination showed a clear anterior chamber and no signs of a previous hemorrhage, although there was easily seen to the lower and outer quadrant of the iris a tear extending from the pupillary border to half the width of the iris. There was no evidence of opacities in the lens, although several small threads appeared on the posterior inner border. Upon moving the eye in and out,



there was a decided tremulous condition of the iris (iridodonesis) to the nasal side, suggesting a probable dislocation of the lens. The pupil being dilated, I tried to make an examination with the opththalmoscope, but on account of a dense cloud in the vitreous was unable to make out the exact condition, though I could see that something was wrong with the fundus. I came to the conclusion that there had been a severe internal hemorrhage, and probably some serious damage done to the inner tunics, so refused to give a diagnosis or prognosis. The pupil was sluggish and responded very slightly to light reflex though a mydriatic dilated it *ad maximum.* Vision O D fingers, O S normal. I prescribed for him full doses of iodide of potash and a pilocarpine sweat every other night for two weeks, directing that he return to see me in about four weeks.

December 19*th.*—Mr. J. T. came to my office, and I found the eye much improved. $V = \frac{20}{30}$ in O D, and with a + 0.5 Cyl. ax. 105, $V = \frac{20}{20}$, O S, $V = \frac{20}{20}$, + 0.25 Cyl. ax. $75 = \frac{20}{15}$. The iridic tear had contracted some, but the pupil was still dilated, and the iris tremulous. Tension normal, accommodation perfect, and iris responded more promptly to light. No luxation of lens could be detected. The little shreds were still seen on the posterior inner border of lens, but no opacities were noticeable. There were several large floating opacities in the vitreous, and one seemed to have become organized, but gave no trouble in vision. Optic disk was normal and also the fundus, except about one and one half optic-disk widths to the nasal side of the papilla was seen clearly what was an isolated rupture in the choroid, over which the retinal veins and arteries passed uninterrupted. The rupture formed a crescent with its concavity towards the papilla, more pointed at the top and increasing in width as it descended until at the bottom it formed a broad and ragged appearance; in length, about two widths of the optic disk. A pigmented veil spread out from the optic disk to either extremity of the tear, otherwise the fundus was normal.

This case seems to me to present some interesting features as to the result of blows upon the eye without a solution of continuity in any of the outer tunics. In most cases that I have been able to see records of, the rupture of choroid has been upon the temporal side, depending upon the direction of the blow, I suppose, although this was not stated. The sluggishness of the iris seen in this case is similar to that reported by Leplat in 1891, where he reports a case, and describes this condition as depending upon a paresis of the terminal fibres of both the third nerve and the sympathetic. In my case the rupture of the sphincter iridis was so complete that the shock to the terminal nerves could not be *solely* responsible for the long-continued dilatation of the pupil, but conforms, I think, to the usual result of an iridectomy. Outside of the fact that the continued mydriasis produces some discomfort and blurring of vision, my patient has a good and useful eye, and can get binocular vision as well as he ever did.

SARCOMA OF THE CORNEAL LIMBUS.*

BY A. N. STROUSE, M.D.

ATTENDING OPHTHALMOLOGIST TO CITY HOSPITAL, OPHTHALMOLOGIST TO MT. SINAI HOSPITAL OUT-DOOR DEPT., ETC.

MALIGNANT growths involving the eyeball and orbit are of comparatively frequent occurrence and have been the subject of an extensive literature. On the other hand, sarcoma and carcinoma originating from the bulbar conjunctiva and cornea are much more rarely encountered, and I have therefore thought it of interest to bring before you the following case of giant-celled sarcoma and make it the subject of a few remarks, chiefly of a practical nature.

Mary N., aged seventy-two years, was first seen by me in November, 1893, at my clinic at the Mt. Sinai Dispensary, and gave the following history: She had always enjoyed good health, and there was no predisposition to malignant growths in her family, her parents having died at an advanced age. She stated that for several months past the vision in the left eye had been gradually failing, although this was unattended with pain or any other disturbance, while for several weeks the left upper eyelid had been so swollen as to almost entirely obscure her sight, so that she had to be led into the clinic. She also suffered from occasional darting pains in the left eyeball.

An examination disclosed the presence of leucomata of the cornea of the right eye. The left upper eyelid appeared to be pushed forward by some underlying swelling, which rendered it impossible for her to raise the lid. The latter was not swollen or œdematous, but tensely stretched over the tumefaction. On forcibly raising the lid, a nodular mass, about the size of a small hazel-nut, presented, having a smooth bluish red, very vascular surface. Its base, which was somewhat constricted, was attached at the sclero-corneal margin. The mass was soft and somewhat elastic. When the eyelid was forcibly pushed upward over the tumor, it was held in this position by the protruding mass, exposing a large extent of sclera and giving the eye somewhat the appearance of exophthalmos. The surrounding parts showed no evidence of inflammation. The loss of vision was entirely due to the position of the growth, which occupied the upper two-thirds of the cornea, obscuring the pupillary space, and when lifted out of the way the sight was at once restored.

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* Read, by invitation, before the Section on Ophthalmology of the N. Y. Academy of Medicine, Nov. 16, 1896.

In view of the localized situation of the tumor and the entire absence of complications I regarded it as feasible to remove it without resorting to the radical procedure of extirpating the eye. A 4 per cent. sterilized solution of cocaine was instilled several times until complete anæsthesia was induced. The lids being separated by an assistant an attempt was made to fix the tumor with forceps, but this was unsuccessful as the tissues crumbled and tore wherever they were grasped, and free hemorrhage occurred from the lacerated vessels. It was therefore considered advisable to remove the growth as speedily as possible, and for this reason the mass was snipped off with scissors at its base. The bleeding was remarkably profuse, the blood gushing from the severed vessels, completely covering the field of operation and running down the side of the face. I immediately applied pressure which was continued for several minutes, but on removing my finger the hemorrhage recommenced to the same extent. The wound was now cleansed as thoroughly as possible, the blood clots removed, and the entire surface cauterized with the actual cautery. This had to be repeated several times before the bleeding was completely controlled. A firm pressure bandage was now applied and the patient sent home, with directions that should the hemorrhage recur she was to come to my office at once.

Two days after the operation she returned to the Dispensary, and on removing the bandage, which was saturated with blood, the wound was found to be covered with a scab, and no signs of inflammatory reaction were noticed. There was still a little oozing of blood which was easily arrested. Vision was now perfect. The bandage was reapplied after thorough disinfection of the parts, and at the end of ten days was left off entirely. The patient received an antiseptic wash to instil into the eye several times daily. The wound cicatrized nicely and left a very small scar.

Owing to the friable character of the neopalism I was unable to obtain a specimen for microscopical examination.

I did not see the patient again for eight or nine months, when she returned with a condition almost identical with that observed at her first visit. The tumor seemed somewhat smaller and of firmer consistence, and the base had extended, encroaching upon a small portion of the cornea. Bearing in mind the profuse hemorrhage at the previous operation it was carefully dissected off from the underlying tissue with the knife, and I was surprised to find that comparatively little blood was lost during the operation. To prevent a recurrence of the growth I deemed it advisable to remove, as far as possible, all the diseased structures and, with this end in view, thoroughly scraped the surface with a sharp spoon. I was impressed at this time with what impunity we could operate upon this region of the eyeball, *i. e.*, the sclerocorneal junction, without producing reactive inflammatory symptoms. The wound surface was cauterized with the actual cautery, and a bandage applied as at the previous operation. The patient made a good recovery, with a small cicatrix, and vision again became good.

She was now kept under constant observation, and with the exception of a few small nodules which reappeared at intervals and were treated with the cautery, she appeared to be relieved of the disease. She was again lost sight of until April, 1895, when she returned stating that she was beginning to lose her vision in the same eye. There was a small flat tumor occupying the original site, which however, had encroached further upon the surrounding tissues and which was treated in the same way, the hemorrhage being inconsiderable.

On several subsequent visits the affected area was cauterized, and during one of these cauterizations the adjacent corneal surface was accidentally touched with the cautery point, leaving behind a small opacity, which fortunately did not encroach upon the pupillary space. The patient remained under observation for a long time during which no recurrence took place. On October 6, 1896, she returned to me, stating that her vision was again failing, and an exmination revealed the condition which I shall now demonstrate to you. (Exhibition of patient.)

At the upper and outer portion of the corneal margin there is a flat, soft, pale-red tumor covered by conjunctival tissue. It is somewhat triangular, the apex extending a short distance over the cornea which is traversed at this portion by milky white processes apparently situated just below the epithelium and extending to the pupillary margin. The base spreads upward and loses itself in the conjunctiva. Movements of the eyeball are free, and there is no glandular involvment.

I am indebted to Dr. Hodenpyl for the report on the microscopical appearances of the portions removed. It reads as follows:

"Sections from various parts of the growth have essentially the same characters. Surrounding and making up about two-thirds of the tumor is a coagulum of blood, the outer margin has the appearance of having being dried. The cells composing the tumor are of various shapes and sizes, the predominating cells being large spindle- and large irregular-shaped cells, many of the nuclei of which show mitotic figures. The cells lie in a fine and exceedingly delicate stroma. The tumor is abundantly supplied with delicate thin-walled blood-vessels. No normal structures were included in the mass. Diagnosis: large irregular cell sarcoma. Parenchymatous hemorrhage."

The origin of these neoplasms is ascribed in most instances to a traumatism, a pre-existing pterygium, to a pigmented spot at the margin of the cornea, or to some form of irritation. In Graefe-Saemisch's Handbook it is stated that most of these growths originate in the sclera. The histories of the cases reported, however, and pathological examinations of the affected structures would rather tend to show that they arise from the conjunctiva, or just at the margin where it merges into the cornea. Rumschewitsch, Lagrange, Soelberg Wells, Silex, Benson, Noyes, Burckhardt, all concur in the view that the growth originates in the conjunctiva or at the limbus. Blanquinque reports a case in which the neoplasm was confined to the cornea, and coincides with Gayet (*Dictionnaire Encyclopédique*), who says he does not understand why the cornea should be incapable of producing cancer. In refutation of this view we may quote Lagrange, who compares the cornea and sclera to tendon, and states that sarcoma of tendon never occurs. This is well illustrated by a case reported by Schwartz as tendon sarcoma, in which a microscopical examination by Cornil demonstrated that the neoplasm originated from the sheath and not from the tendon itself. We may therefore conclude that the cornea becomes secondarily involved, and only so far as its epithelium is concerned, the corneal tissue proper, *i. e.*, the substantia propria, never being attacked.

The attention of these patients is first attracted by the presence of a small pigmented spot which may have existed for a number of years before the appearance of any tumefaction. When the tumor has made its appearance we usually get a history of some traumatism, either accidental or intentional, as in the case of removal of a pterygium, while in other instances we can elicit no history of a pre-existing lesion. As the growth increases in size there occur symptoms of mechanical interference with the surrounding parts. There is present a sensation of a foreign substance in the eye, especially on closure of the eyelids, and still later when the growth has attained larger proportions there is limitation of the movements of the eyeball as well as of the lids, which become fixed either over the tumor, or the latter may protrude and prevent perfect closure of the lids. Pain is absent in most of these cases. Patients tell us that occasionally there is pain of a lancinating character and sometimes a feeling of pressure, which, no doubt, is due to extravasations of blood into the meshes of the tumor. Interference with vision is not complained of until the growth has attained sufficient size to overlap the pupillary space. Loss of vision increases proportionately with the growth of the tumor. Occasionally a hemorrhage occurs externally as the result of erosion of a vessel or of the laceration of the tumor by being caught between the lids during forcible closure, In the early stages the growth seems to be confined to the tissues in the immediate neighborhood of the limbus, and only after a long period are the surrounding structures invaded, in so far that the neoplasm insinuates itself beneath the epithelium of the cornea and extends in the conjunctiva,

AUTHOR.	JOURNAL.	AGE.	SEX.	HISTORY.	MICROSCOPICAL EXAMINATION.	TREATMENT.	REMARKS.
Benson.	*Ophth. Review*, vol. vi., 1887.	11	M.	In 1883 small, movable, dark spot on conjunctiva near cornea. Enlarged in next three years, and is now attached at limbus.	Melanotic tumor with sarcoma-like cells.	Excision of tumor.	No recurrence.
Barrenechea.	*Centralb. f. prakt. Augenheilk.*, vol. xiii., 1889.	52	M.	Slight injury at orbital ridge three years previously; half year later a small growth at edge of cornea, which is now larger than eyeball and extends around to the optic nerve.	Large cell sarcoma.	Exenteration of orbit.	Recurrence. No metastases.
Silex.	*Arch. f. Augenheilk.*, vol. xx., 1889.	63	F.	Black patches at corneal margin for ten years. Hazel-nut-sized, warty, black tumor, for two months.	Melano-sarcoma.	Excision of tumor.	Recurrence of tumor soon after removal, but patient failed to return until four years later. Excision and galvano-cautery. Recurrence two years later; operated one year after.
Silex.	*Ibid.*	64	F.	Round, blackish-blue tumor, with uneven surface at corneal margin for nine weeks.	Melano-sarcoma.	Extirpation of tumor.	Recurrence after about one year; extirpation. Another recurrence with foci in upper lid during same year; removal.
Silex.	*Ibid.*	29	M.	At outer margin of cornea a red spongy growth resembling a pteryguim; existing for three years.	Melano-sarcoma. No involvement of globe. In some places an alveolar structure.	Enucleation after previous excision.	
Silex.	*Ibid.*	49	M.	Black nodules on left eye in 1879; removed in 1881 and 1882. In 1886 large and small black tumors at lower corneal margin; removed in May and recurred in November. In 1888 large, black, nodular growth over cornea and adjacent sclera; also three smaller tumors.	Melano-sarcoma. Globe and cornea intact, except superficial epithelium.	Enucleation.	No metastases in orbit or body. Recovery.
Holmes.	ARCH. OF OPHTHAL., vol. vi., 1887.	40	F.	Small spot at sclero-corneal margin for many years, having appearance of a pterygium.	Small, round-cell melanosarcoma; thin-walled blood-vessels.	Twice removed; then enucleated.	Cured.
Lagrange.	*Arch. d'ophtal.*, vol. iv., 1884.	42	F.	Pains in eye for two years. Tumor for fifteen days at sclero-corneal margin. Black mass size of a small egg. Frequent hemorrhages; no glandular enlargement.	No infiltration of interior of eye. Corneal epithelium only involved. Fusiform cells; old hemorrhages; pigment.	Enucleation.	Cured; no recurrences.
Badel.	Cited by Lagrange. *Ibid.*	75	F.	Black spot at limbus for fifteen years. Tumor black and of size of mushroom. No glandular enlargement.	Round and spindle cells; pigment. Sclera and cornea intact.	Enucleation.	Cured; no recurrence.

——	Cited by Lagrange. *Ibid.*	—	—	Bluish tumor at sclero-corneal margin.	Adherent to superficial portions of cornea. No opacity. Round-cell sarcoma.	Extirpation of tumor.	
Hedden.	Cited by Lagrange. *Ibid.*	—	—	Tumor at sclero-corneal junction.		Extirpation of tumor.	No return at end of two years.
Adamück.	*Arch. f. Augenheilk.*, Bd. xi., 1881.	40	M.	Black spot of long duration at sclero-corneal margin.	Sclera not involved. Spindle cells.	Extirpation of tumor.	No recurrence at end of one year.
Remak.	*Arch. f. Augenheilk.*, Bd. xvi., 1885.	—	F.	Tumor at sclero-corneal margin for three years. At time of admission size of an apple, grayish-red color, arising by small pedicle from corneal margin. Sclera practically intact. No metastases.	Small round and spindle cell sarcoma. No intraocular involvement.	Extirpated three times, but always recurred. Finally enucleation.	
Lawford.	*Royal London Ophthalm. Rep.* 1889.	38	M.	Small spot for ten years. Reddish granular mass, size of small pea, at sclero-corneal margin.	Small, spindle-cell sarcoma; no pigment.	Partially removed; recurred rapidly and again removed.	
Roberts.	*Brit. Med. Jour.*, 1889.	—	—	Situated at limbus.	Melano-sarcoma.	Extirpation of tumor.	Recurrence after two years.
Pooley.	*Virg. Med. Monthly*, vol. xviii., 1891.	47	M.	Small black spot at limbus for three years. Coal-black, leech-like tumor. Another of smaller size at lower corneal margin.	Melano-sarcoma. No microscopical examination.	Extirpation of tumor.	No recurrence.
Rumschewitsch.	*Arch. f. Augenheilk.*, vol. xxiii., 1891.	61	M.	Blow on head causing bleeding from right eye. Yellowish-red, smooth, soft tumor at edge of cornea.	Spindle- and round-cell sarcoma.	Enucleation.	Vision lost after blow.
Blanquinque.	*Rec. d'ophtal.*, 1892.	60	F.	Small spot for twenty years. Tumor of size of pea on cornea (?) for nine years.	Melano-sarcoma.	Removal and galvano-cautery. Cauterized several times at short intervals.	
Schultze.	*Klin. Monatsbl. f. Augenheilk.*, vol. xxxii., 1894.	14	F.	Round spot one year. Flat brownish-red, smooth, tumors at sclero-corneal margins of both eyes. Not attached to cornea.	Large, round-cell melano-sarcoma.	Excised and scraped.	
Schultze.	*Ibid.*	61	F.	Growth for three years. Round, soft tumor at corneal margin.	Large, round-cell sarcoma; little pigment.	Excised and scraped.	Recurrence one year after; same treatment. Another one and a half years later. Exenteration of orbit. No glandular enlargement.
Donaldson.	*Trans. Ophthal., Soc., United Kingdom*, vol. xv., 1895.	21	F.	Round, grayish, gelatinous-looking tumor at sclero-corneal margin for nine months.	Alveolar sarcoma; round nucleated cells.	Excision of tumor.	No recurrence at end of one month.
Sgrosso.	*Annal. di Ottalmol.*, 1892.	—	—	Three cases.	Giant-cell-, small-cell-, and melano-sarcomata.		No involvement of interior of eye.

advancing even to the lids. The preauricular glands and the glands at the angle of the jaw are rarely if ever affected by the disease.

Pathology: Microscopical examination of these tumors shows them to consist of a fine network of connective tissue supplied usually with an abundance of blood-vessels, and containing large or small round and fusiform cells. In the nuclei of these cells we occasionally observe caryokinetic figures. In the majority of instances pigment is also found.

Extravasations of blood into the meshes of the growth are likewise of frequent occurrence. In those cases in which enucleation has been performed sections of the eyeball have invariably revealed that the neoplasm has not invaded the eye, but has remained confined to the epibulbar structures. Shiele, cited by Burckhardt, shows how the neoplasm proliferates from the conjunctiva, leaving the sclera and cornea intact, but forcing itself between the corneal epithelium and the substantia propria. It is this fact of the superficial situation of the growth which I would emphasize in this connection, since it justifies repeated attemps to secure a cure by excision before resorting finally to the more radical procedure of enucleation or exenteration.

Treatment: While recognizing the importance of thorough removal, where possible, of any organ affected by sarcoma, this does not apply to the eye, for we appreciate that these growths show no tendency to the formation of metastases at any time, or even to wide extension from their original site. In view of these considerations, it seems to me unjustifiable to resort at once to radical measures of enucleation or exenteration of the orbit. When these tumors are found to be confined to the region of the limbus, they should be removed with the knife or scissors, and the base should be thoroughly scraped with the sharp spoon, and as a precautionary measure cauterized with the galvano-cautery. Even recurrent growths may be treated in this manner, as long as they show no tendency to rapid extension. As many of these growths are quite vascular, difficulty will frequently be encountered in checking the profuse and occasionally alarming hemorrhage. This is best accomplished by the cautery, supplemented by the application of a firm pressure bandage. Under use of strict antiseptic precautions the wound will usually heal promptly and leave behind a small, smooth scar, which does not interfere with the movements of the eyeball. The opinions here expressed are in complete accord with those of other observers, with, perhaps, the exception of Wilder, who is skeptical that anything short of enucleation will check the malignant process, although even he concedes that when the growth is small and has not invaded corneal and scleral tissue it may be removed with hope of success. Silex concludes that a cure can be effected if excision be done thoroughly and carefully, and he reserves enucleation for those cases in which the patient cannot be kept under observation, or in which vision is entirely destroyed. In this conclusion he is supported by Pooley, Blanquinque, Noyes, and others. He further states—and I concur in this opinion —that where conjunctival defects are left after operation it is seldom necessary to suture them, since even large defects cicatrize without interfering with the movements of the eye or producing ulceration of the sclera.

In conclusion I would offer the following summary:

1. Sarcoma of the limbus is of comparatively rare occurrence.
2. It never invades the interior of the eyeball, but remains confined to the external structures.
3. Metastases practically never occur.
4. Recurrences are frequent, but do not contra-indicate conservative measures in treatment.
5. Radical procedures, enucleation or exenteration, are unjustifiable except in those cases in which the growth has attained extensive proportions or in which vision has been destroyed.

A CASE OF BILATERAL KERATITIS PARENCHYMATOSA, BASED ON LUES HEREDITARIA TARDA, WITH MARKED TRANSITORY DIMINUTION IN TENSION AND VOLUME OF THE RIGHT EYE. (OPHTHALMOMALACIA SECUNDARIA.)[1]

By Dr. H. MUETZE, St. Louis, Mo.

IT is a well-known fact, that in different diseases of the cornea fluctuations occur in the tension of the affected eye. These disturbances in tension cause no anxiety to the oculist, as long as no diminution in the size of the eyeball manifests itself. If, however, a diminution of the globe becomes apparent in connection with furrows, and with alterations in the visual field, we are justified in diagnosticating phthisis bulbi and considering the eye irretrievably lost. Exceptionally such an eye may recover.

In 1879 Klein[2] reported two cases, in which phthisis bulbi was diagnosticated in connection with a keratitis and still complete restitution took place afterward.

The *first* case concerned a young man, nineteen years of age, in whom keratitis parenchymatosa developed first in the right, and later in the left eye, without any known cause whatsoever. The disease progressed rapidly, and owing to the grayish-white opacities and the enormous formation of new vessels, the cornea soon assumed a grayish-red appearance and shortly afterwards became entirely opaque. There existed moderate pain, marked episcleral injection, and considerable photophobia. In the sixth and seventh week the right, and then the left eye, began to get smaller. All therapeutic measures failed to arrest the process of diminution and a very unfavorable prognosis was given. About a year afterwards, however, the patient presented himself with *almost complete restoration of the visual power and normal dimensions of both eyes.*

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[1] From the Eye-Clinic of the University of Marburg, Germany.

[2] Klein, *Lehrb. d. Augenheilk.*, Vienna, 1879, p. 233.

The *second* case was that of a laborer, who was suffering with keratitis parenchymatosa in consequence of former syphilitic affections. In the seventh week the right ball began to diminish in size, and gradually complete atrophy of the ball supervened. About the same time the left eye became affected, although the process never reached the same degree as in the right eye. Inunctions of mercurial ointment were ordered ; the inflammatory symptoms disappeared, and later the right eye, which was considered lost at first, began to regain its normal size. One year later, *the size and tension of both eyes were entirely normal.* As our case is none the less interesting, I have considered it proper to describe it in detail.

Elizabeth R., twenty-eight years old, was received as a patient at the Marburg Eye-Clinic, Feb. 22, 1893, at the solicitation of her attending physician, Dr. FREUDENSTEIN. According to the statement of Dr. Freudenstein her father, deceased, was for a long time an inmate of the Marburg Insane Asylum ; her brother committed suicide in an attack of melancholia ; her mother died with phthisis. Patient herself has a tendency to hypochondria and melancholy attacks. When a child, she suffered with scrofula, and learned to walk late. At the age of twelve years, the menses appeared, which always returned regularly and copiously until she got married. Patient is mother of four healthy children, the last having been born one and a half years ago. She has never aborted ; the menses were regular and plentiful with exception of the last time, when they stopped after the second day.

In October, 1892, patient noticed a swelling of the cervical glands, and soon after both ears began to ring. By the use of an ointment the glands became smaller again. At the same time vision in the right eye gradually began to fail, and a little later also in the left. Besides the amblyopia and photophobia, patient had comparatively little trouble. December 11th, she consulted Dr. Freudenstein, who diagnosticated bilateral keratitis parenchymatosa with marked photophobia and posterior synechiæ. Atropine and sodium salicylate were now administered with only moderate success ; in the course of time patient became so melancholy, that Dr. Freudenstein, as mentioned above, concluded to place her in a hospital, thinking that a change of surroundings might have a beneficial influence on the condition of the patient.

Status præsens.—Very pale, medium-sized, moderately well-nourished woman. On the left side of neck a number of medium-sized indolent lymphomata. Below the angle of right jaw, a few very small glands can be detected. From both angles of the mouth little folds run downward and outward. The hard palate has the shape of a pitched roof. Upper central incisors are not convex on the cutting edge, but crescent-like concave; canine teeth are excavated in the same manner. Hutchinson's teeth. Patient is very hard of hearing. No abnormalities in respiratory and genito-urinary tract. No sensory or motor disturbances.

Eyes.—Pericorneal injection. Marked photophobia; no epiphora. Corneal epithelium smooth, but considerable interstitial opacity with moderate broom-straw-like formation of vessels.

Right Eye.—Entire cornea opaque. By lateral illumination a number of posterior synechiæ are recognized with some difficulty. Anterior chamber of medium depth. No ophthalmoscopic reflex.

Left Eye.—Inner surface of cornea fairly translucent. Pupil irregular. Grayish-red ophthalmoscopic reflex. R V = number of hands in 1 *m.* L V = fingers in 1 *m.* Ordered: inunctions of blue ointment, potassium iodide, atropine, cocaine salve, and boracic acid applications.

During the first night of her presence in the hospital, patient complains of pain in left side of neck, walks up and down the room, sits on the beds of other patients, but is otherwise conscious, and goes to sleep after the administration of morphine sulphate 0.01 hypodermically.

March 8, 1893.—Patient is sent to Prof. Barth for examination of her ears. Result: nervous disturbance of hearing with still existing subacute symptoms of irritation. Whispered speech in 0.2 *m.* As causal agent, lues must be thought of in the first place.

The clearing up of the cornea takes place very slowly, especially in the right eye.

April 24th.—V R = fingers in 0.5 *m.* V L = fingers in 6 *m.* (The seven-year-old daughter of patient who comes to see her mother, May 16th, is suffering with incomplete ophthalmoplegia interna in her left eye; knee-jerk absent.)

May 20th.—No alteration in corneal opacities. *Right eye more sensitive to pressure ; tension greatly diminished.* No improvement in hearing power. Otherwise patient feels well. Discharged by request, with potassium iodide and atropine salve.

When patient presented herself again, June 18th, *phthisis bulbi incipiens* is diagnosticated in *right eye.* Cornea uneven ; $- T_2$. R V = number of hands in 0.5 *m.* Anterior chamber shallow. Apparent occlusio pupillæ. Left cornea a little clearer, but there are extensive posterior synechiæ ; no ophthalmoscopic reflex. L V = fingers in 5 *m.* Patient re-entered hospital, June 25th ; during her stay the condition of left eye remained about the same.

R : *The entire ball is a little diminished in size ; the corneal diameter is distinctly smaller than in the left eye. Cornea not ulcerated, but uneven as in beginning shrinking of the ball.* Distinct deep vascularization. Anterior chamber very shallow ; occlusio pupillæ ; $- T_2$ to $- T_3$. Considerable pericorneal injection. No sensitiveness either spontaneous or on pressure. R V = number of hands in 0.3 *m.* Field of vision contracted, especially towards nose.

July 2d.—Right eye more congested, but not sensitive. *Flattening out of cornea increasing ;* its surface smoother.

July 16th.—Phthisis has advanced more ; patient is discharged by request, with potassium iodide and atropine.

July 20th.—Left cornea decidedly clearer. Grayish-red ophthalmoscopic reflex. No details. L V = $\frac{3}{36}$ + 4.00 D S. Sn 2.0 in 15 *cm.* R V = fingers in 10 *cm.* Field of vision free for movements of hand. *Contour of cornea seems better. Entire ball distinctly diminished in size.* Indication of furrows ; $- T_2$.

Sept. 4th.—Right ball is of approximately normal dimensions. Cornea not smaller than in left eye, but a little more flat and uneven. Tension diminished, but essentially better than July 23d. Furrows not so distinct as before. Anterior chamber shallow ; very dense, typically vascularized opacities in cornea. Eye not sensitive, but somewhat injected. R V = number of hands in 1 *m.* Numerous translucent spots in left cornea ; below, well-marked opacity, possibly deposit. Almost complete posterior synechia with lentil-size pupil. Grayish-red ophthalmoscopic reflex, but no details. L V = $\frac{6}{60}$ + 4.00 D S. Sn. 1.6 in 15 *cm.*

By request, patient presents herself April 13, 1896, again. She gave birth to a healthy child two years ago. There are pretty dense opacities in both corneæ. R, below, transparent, white opacities; atrophy of iris; pupillary membrane; strabismus divergens. Field of vision free. *Perfectly normal size and tension of ball.* R V = fingers in 1 *m.* L strong posterior synechiæ. Ophthalmoscopically, papillæ can be recognized; no details. L V = $\frac{6}{24}$. Sn 0.5 in 15 *cm.*

May 7th.—R *Iridectomy.* Transitory increase in tension during after-treatment. Discharged May 29th with clear coloboma. R V = fingers in 2–3 *m.*

The daughter Anna. Both eyes: myopia, objectively, 7.5 D. Incomplete ophthalmoplegia interna. Pupils moderately dilated, a little more in right than in left eye. Slight ptosis of right lid. Pupillary reaction weak to reflected light; a little more in convergence. Reaction better in left than right eye. Accommodation completely paralyzed. Function of horizontal muscles decidedly impeded, other muscles appear normal. R Strabismus divergens. Knee- and foot-sole reflex absent. No disturbance of motility. Striking hypalgesia of legs. Patient complains of sharp pains in legs at times. No ataxia; intellect good.

Diagnosis of Dr. Nebelthau.—Tabes incipiens.

In the foregoing history we find several points which undoubtedly permit us to assume that our patient was suffering with keratitis parenchymatosa due to hereditary syphilis. The fact that simultaneously with the corneal inflammation, ringing in the ears and hardness of hearing set in, which gradually increased until the hearing power of patient was considerably impaired, speaks strongly in favor of our diagnosis. The medium-sized indolent lymphomata on the left side of the neck and below the angle of the right lower jaw, as well as the linear cicatrices, relics of former rhagades, running from the angles of the mouth outward, form an additional proof.

The conspicuous deformity of the upper central incisors, which has been described by Hutchinson[1] as specially characteristic of inherited syphilis, combined with the pitched-roof shape of the hard palate, are symptoms which we only find in hereditary lues. The value of the above symptoms is to be rated so much higher, as in a recent discussion of a paper, read by Dr. C. Silex[2] before the Berlin Medical Society on "Pathognomonic Symptoms of Congenital Lues," in which, amongst others, Hirschberg participated, it was decided that *the deformity of the upper central incisors* in connection with the scars at the angles of the mouth are to be regarded especially pathognomonic of hereditary lues. No sequelæ of acquired syphilis, such as scars, etc., can be detected on the patient's body ; besides she has never aborted, but has given birth to healthy children until two years ago. Soon after the administration of potassium iodide, atropine, and inunctions of mercurial ointment, not only the above-mentioned lymphomata disappeared, but the condition of the cornea improved essentially. This improvement continued under the anti-syphilitic treatment, and at present the disease has run its course, leaving behind some corneal opacities and posterior synechiæ. As patient frequently suffers with attacks of melancholia, and her brother committed suicide in such an attack, and as her father was treated for a long time at the Marburg Insane Asylum for brain disease, we can draw the conclusion that the syphilis acquired by the father was transmitted by heredity to the children.

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[1] Hutchinson, *Diseases of the Eye and Ear.* London, 1863.

[2] Silex, C., "Pathognomonische Kennzeichen der congenitalen Lues," *Berl. klin. Wochenschr.*, 17 u. 24 Feb., 1896.

It is generally accepted (*cf.* the text-books of Fuchs,[1] Schmidt-Rimpler,[2] Michel,[3] Panas,[4] Soelberg-Wells,[5]) that keratitis parenchymatosa, based on hereditary syphilis, is a disease of childhood or adolescence, occurring principally between the sixth and twentieth year, rarely before or after this age. If we consider the age of our patient, it is at once apparent that this is one of the rarer cases of keratitis parenchymatosa after doubtless lues hereditaria tarda, as they have also been observed by Hirschberg,[6] Pfister,[7] Parinaud,[8] and Hutchinson, Jun.[9] (I should like to call particular attention to the rare occurrence that the daughter of patient presented distinct symptoms of tabes incipiens with multiple paralyses of the ocular muscles at the early age of eight years. The syphilitic etiology of tabes and paralysis having been pointed out by Erb principally, it is certainly very remarkable to see these symptoms appear at such a youthful age, as we are all well aware that the hereditary syphilis of the mother is neither inheritable nor transmissible. How far the following generations are affected through it with these diseases, cannot be decided at present.[1])

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[1] Fuchs, *Lehrbuch d. Augenheilk.*, 1895.

[2] Schmidt-Rimpler, *Augenheilkunde und Ophthalmologie.* Berlin, 1891.

[3] Michel, *Lehrbuch d. Augenheilk.* Wiesbaden, 1884.

[4] Panas, *Traité des Maladies des Yeux.* Paris, 1894.

[5] Soelberg-Wells, *A Treatise of the Diseases of the Eye.* London.

[6] Hirschberg, J. "Ueber specifische Hornhautentzündung," *Centralbl. f. prakt. Augenheilk.*, 1888, pp. 216 and 254.

[7] Pfister, Jul. "Hundert und dreissig Fälle von Keratitis interstitialis diffusa incl. fünf Fälle von Keratitis interstitialis annularis nach Vossius." *Klin. Monatsbl. f. Augenheilk.*, 1890, p. 114.

[8] Parinaud, H. "La kératite interstitielle et la syphilis héréditaire." *Arch. gén. de méd.*, ii., p. 521.

[9] Hutchinson, J. "A Series of Five Patients, Illustrating Interstitial Keratitis and Syphilitic Teeth." *Clin. Journ.*, Dec. 12, 1894.

Our case is of especial interest, however, on account of the above-mentioned marked transitory diminution in tension and volume of the right eye. We see from our history that, May 16th, the tension of the right eye is considerably lowered.

June 18, phthisis bulbi incipiens is is diagnosticated, which progresses until, June 25th, a distinct diminution of the entire right eye has taken place. The cornea is uneven ; $-T_2$ to $-T_3$.

July 16, the apparent phthisis has advanced still farther.

July 23, the cornea has a better contour, although an indication of furrows still exists ; $-T_2$.

When patient presented herself, September 4th, again, however, the ball had almost returned to its normal size and tension. At present the *dimension and tension* of the right ball are *perfectly normal.* The question arises, how this process, which affected the right eye simultaneously with keratitis parenchymatosa is to be understood. We can hardly assume that we are dealing with a hypotony, as described by Nagel, *i. e.*, a simple softening of the ball, which occurs frequently in diseases of the cornea, especially in keratitis parenchymatosa. Although a tangible diminution in tension is observed in these cases, yet a condition, as described above, never prevails. At first progressive phthisis had to be diagnosticated, but this was not the case ; for, after some time, the bulb not only returned to, but also preserved, its normal size and tension. If by the word phthisis therefore we designate the irreparable atrophy, I do not consider it commendable to call a case like ours phthisis bulbi, although Klein does so in his two cases (*cf.* article on phthisis bulbi, Eulenburg's *Realencyclopædia*). I prefer to call this process ophthalmomalacia on account of its favorable course and, as it occurred secondary to keratitis parenchymatosa, I should designate it "ophthalmomalacia secundaria." The conditions first described by Schmidt-Rimpler[2] as simple and intermittent ophthalmomalacia would have to be considered primary affections of a hitherto healthy eye. With this secondary ophthalmomalacia, all those cases would have to be classified in which, following some other disease of the eye, a marked transitory diminution in tension and volume takes place. We therefore include not only the above-mentioned cases of Klein (*l. c.*), but also those reported by Schweigger[1] and Landesberg.[2]

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[1] Galezowski has reported recently that the children of parents affected with hereditary syphilis are liable to suffer with keratitis parenchymatosa. *Recueil d'ophtalmologie*, 1896, p. 1.

[2] Schmidt-Rimpler. "Essentielle Phthisis Bulbi s. Ophthalmomalacie." Graefe-Saemish, *Handbuch d. ges. Augenheilk.*, Leipsic, 1875.

I beg leave to thank Prof. Uhthoff for kindly allowing me to publish the above case, and Dr. Axenfeld for his suggestions and valuable assistance in working it up.

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[1] Schweigger, *Handbuch d. speciellen Augenheilk.*, Berlin, 1875, p. 532.

[2] Landesberg, *Archiv f. Ophthalm.*, xvii., 1, p. 303.

Refer. Schmidt-Rimpler, Graefe-Saemisch, v., pp. 151 and 153.

A CASE OF MYCOSIS OF THE INFERIOR CANALICULUS.

By Dr. JOHN DUNN, of Richmond, Va.

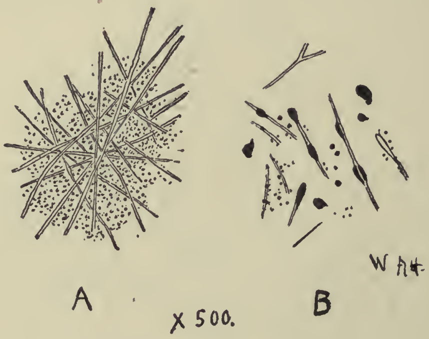
(*With one figure in the text.*)

In November, 1896, a negro woman, aged twenty-four, came to the Richmond Eye Infirmary, complaining that her left eye annoyed her. Examination showed, protruding from the inferior canaliculus through the punctum, a whitish mass, in appearance resembling the mycotic aggregations not unfrequently seen on the tonsils, faucial and lingual. The diagnosis, mycosis of the inferior canaliculus, was made and the patient was told to return the following day for treatment. Nothing was seen of her for about two weeks. When she did return she was covered with a syphilitic eruption. She had also double iritis, together with a mucous patch of the conjunctiva of the left lower lid. At this visit there was no whitish mass to be seen projecting from the punctum. The iritis proved to be severe, and while the patient was under treatment nothing was noticed of an existing mycosis. Whether atropin had any effect in checking the growths I am unable to say. In the hurry of clinic work and in the presence of the great pain occasioned by the iritis no special examination was made of the inferior canaliculus. On February 2, 1897, the negress, whose visits to the clinic had been at irregular intervals, again appeared there complaining that something formed in the corner of her left eye and rubbed against the ball. A whitish mass was again protruding from the inferior punctum. (The use of the atropin had been for some days discontinued.) In the inferior cul-de-sac were several whitish strings of what was apparently mucus, but which under the microscope proved to be formed of roundish cellular bodies, probably spores, and a mycelium, fine and of varying lengths, resembling closely that of the leptothrix buccalis. The cellular bodies were, relative to the diameter of the pieces of mycelium, very large. The quantity of this whitish stringy mucus accumulating in the inferior cul-de-sac was noteworthy; a fresh amount was present every minute or two; so much was this the case that I several times examined the conjunctiva to see if the fungus was growing from it. And I am inclined to think that, while the basis of fresh supply was always the inferior canaliculus, a further development of the fungus, pushed from the punctum took place in the inferior cul-de-sac, which was the seat of numerous enlarged follicles. The inferior canaliculus was slit along its entire length, when with a small spoon was removed about as much of the mycotic masses as would be represented by two of the smaller size of garden pea. The inferior punctum had been considerably enlarged by the fungus growing as it was pushed through it. The canaliculus, too, had been widened in all directions. No communication with the lachrymal sac could be found. There was no evidence of a similar affection of the upper canaliculus, through which a probe could be passed into the sac, which, however, was very small and had no communication with the nose.

Under the microscope the masses removed from the canaliculus were found to furnish the same characteristics as the stringy pieces found in the inferior cul-de-sac. In regard to the duration of this mycosis of the inferior canaliculus, nothing could be found out. The patient said that her left eye had "run tears" all her life. How the fungus found its way into the canaliculus is also an open question. There were no mycotic masses visible in either nose or throat. The canaliculus was washed out with a solution of nitrate of silver, twenty grains to the ounce, on two consecutive days, following which there was no recurrence of the mycosis. Patient was seen last on February 24th.

It is not unlikely that in this case the closure of the sac end of the canaliculus took place first, and that the spores of the actinomyces found their way in through the punctum. This is rendered probable by the fact that none of the fungus was found in the sac or in the superior canaliculus. That there existed no evidence anywhere along the mucous membrane of any ulceration, and the readiness with which a cure was effected after slitting the canaliculus, would point to mycosis of this particular region as one of the less important of the affections of the eye. Several of the mycotic masses were sent to Dr. Ward A. Holden, who kindly examined them and reported as follows:

"The specimen as received consisted of yellow shreds one or two millimetres in diameter floating in a liquid. These little shreds, when flattened under a cover glass, were found to consist of a number of interlacing rods imbedded in a mass of spores. The rods were fairly uniform in thickness and of various lengths, straight or slightly curved, and with no regular or characteristic arrangement. (Fig. A.) Leber's test for Leptothrix buccalis—a violet reaction with iodine—was negative. Attempts to obtain stained cover-glass preparations were not particularly successful, and the clearest picture was obtained by dropping a weak anilin stain on the freshly crushed specimen, when the spores stained readily, and the rods scarcely at all. In such preparations many varieties of rods were found (Fig. B), some with large globular spores in the substance of the rod or at one end, others with club-shaped ends, some staining and some not, and an occasional rod forked dichotomously. The spores varied in size from a diameter less than that of a rod up to a diameter ten times as great.



"This micro-organism corresponds in the main with the descriptions of those found by others in concretions in the canaliculi, and formerly considered Leptothrix buccalis but denominated actinomyces by Schroeder (*Klin. Monatsbl. f. Augenheilk.*, 1894, No. 4), and since then by Elschnig, Ewetzky, and others; it having been found that actinomyces growing free does not exhibit the radial arrangement of rods with club-shaped ends which characterizes its development in the tissues."

Ewetzky, in his interesting article, "L'actinomycose des conduits lachrymaux" (*Arch. d'ophtal.*, April, 1896), from which the appended bibliography is copied, says that von Graefe considered these whitish concretions found in the inferior canaliculi as products of the fungus "Achorion Schönleini." Later Cohnheim and Leber referred their origin and composition to the Leptothrix buccalis. In 1874, F. Cohn found in these masses a special fungus, which he called "streptothrix Foesteri." In 1893, Tomassoli wrote a paper on actinomycosis of the inferior canaliculus. It remained for Th. Schröder, in 1894, to demonstrate that the "streptothrix Foesteri" and actinomyces were identical. Since the appearance of Schröder's paper, cases have been reported by Huth, Elschnig, and Ewetzky.

BIBLIOGRAPHY.

1. VON GRAEFE, *Arch. f. Ophth.*, vols. i., ii., xv.
2. FOERSTER, *Ibid.*, vol. xv.
3. NARKIEWITCH-IODKO, *Klin. Monatsschr. f. Augenheilk.*, 1870.
4. SCHIRMER, *Ibid.*, 1871.
5. DEL MONTE, *Nagel's Jahresbericht*, 1872.
6. GRUENING, *Arch. f. Augenheilk.*, vol. iii.
7. BUGIER, *Nagel's Jahresbericht*, 1874.
8. HIRSCHLER, *Ibid.*, 1874.
9. HIGGENS, *Ibid.*, 1879.
10. HAASE, *Arch. f. Augenheilk.*, vol. viii.
11. CAMUSET, *Nagel's Jahresbericht*, 1884.
12. GOLDZIEHER, *Centralblatt f. pract. Augenheilk.*, 1884.
13. V. REUSS, *Wien. medic. Presse*, 1884, Nos. 7 and 8.
14. LEPLAT, *Revue générale d'opht.*, 1885.
15. GRÜNHUT, *Präger medic. Wochenschr.*, 1888, No. 23.
16. TOMASSOLI-CUÉNOD, *Bacteriol. et parasitol. cliniques des paupièrez.* Paris, 1894.
17. SCHROEDER, *Klin. Monatsschr. f. Augenheilk.*, 1894.
18. HUTH, *Centralbl. f. pract. Augenheilk.*, 1894.
19. ELSCHNIG, *Klin. Monatsbl. f. Augenheilk.*, 1895, No. 6.
20. EWETZKY, *Arch. d'opht.*, April, 1896.

METASTATIC CARCINOMA IN THE UVEAL TRACT OF BOTH EYES.

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Translated and Abridged by Dr. Denig, New York.

(*With Plates* I–III *of Vol. XXXIII. of Germ. Ed.*)

THE only case of primary carcinoma of the ciliary body, observed and anatomically described, was that of Badal and Lagrange[1]: The left eye of a boy of eight years, amblyopic since early youth, became blind three years before. The eye became larger, inflamed, and painful. The ciliary body of the enucleated eye showed two white tumors, the size of a pea, composed for the most part of typical carcinomatous tissue.

Cases of metastatic carcinoma of the ciliary body are also very rare. The only one was reported by Ewing[2]: A woman, suffering from primary carcinoma, located in the breast, showed metastatic carcinoma of the choroid, ciliary body, and iris of both eyes.

In addition to this the following tumor of metastatic carcinoma not only of the choroid, but also of the iris and ciliary body, seems worthy of publication.

June 12, 1894, a woman, forty-four years of age, came to the clinic stating that the sight of both her eyes began to fail three weeks previously. The ophthalmoscope revealed a flat detachment of the retina, occupying the temporal side of the retina of left eye and the region near the yellow spot of the right. R = + 5.5; V = $\frac{6}{36}$. L = fingers counted in 10 *cm.* Tension normal.

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[1] ‘ Carcinome primitif des procès et du corps ciliare." *Arch. d'ophtal.*, 1892, T. xii., 3.

[2] *v. Graefe's Archiv*, xxxvi., 1.

A primary carcinoma was discovered in the right breast; this had commenced about a year before and since then had increased continuously. Patient died three months later.

On *macroscopical* examination of the right eye a diffuse thickening of nearly the whole choroid is noticed. It begins around the optic disc and passes gradually into the normal choroid near the ora serrata (Fig. i., R), having the appearance of a flat tumor, the greatest thickness of which is 2. 5 *mm* on the temporal side of the ball. The retina is detached from the papilla to the ora serrata and the subretinal space is filled with coagulated masses. The lens, dislocated artificially through cadaveric maceration of the pigment and cylinder-epithelium of the ora serrata and the ciliary processes, lies on the detached retina (Fig. 1).

Microscopically the tumor is seen to have a typical carcinomatous structure: new formed connective tissue, forming alveoli, filled with epithelial cells (Fig. 2), some of which are round, others polygonal, 10.5—2.5 μ broad, the larger taking the stain better. Typical giant cells have not been found. At some points there are delicate connective-tissue fibres, enclosing fixed and pigmented cells and free pigment. At other points there are bundles of coarse connective tissue, especially near the sclerotic. The tumor contains also necrosed tissue (Fig. 4 a), degenerated cells not taking the stain, free pigment, many red blood corpuscles, and especially at its margin, small blood-vessels. At some points the capillaries of the choroid are surrounded with carcinomatous tissue, but they contain no emboli of carcinoma cells, whereas many emboli are found in the posterior ciliary arteries, near their passage through the sclera. Some of the capillaries contain carcinoma cells and shrunken red blood corpuscles, others carcinoma cells only (Fig. 3).

Only the inner layers of the sclerotic show a scant infiltration with epithelial cells; the outer layers are separated by a pigmented zone from the tumor. The detached retina shows no changes except some hemorrhages. The optic disc is somewhat infiltrated with carcinoma cells (Fig. 2 a) on its temporal side; the region of the ciliary body near the choroid is normal, while the origin of the iris in the ciliary body, on its lower and temporal side, is infiltrated with carcinoma cells; the latter pass through the filtration angle into the anterior chamber, invading the circular fibres of the ciliary muscle, but do not penetrate into the ciliary processes. The connective-tissue frame-work of this carcinomatous focus is very delicate. The adjacent parts of the iris and ciliary body show some round-cell infiltration. No carcinoma cells are found in the capillaries. Cornea and lens are normal.

The microscopical aspect of the left eye does not differ very much from that of the right. The carcinoma cells, causing a diffuse thickening of the choroid of the right eye, have produced distinct carcinomatous foci in the choroid of the left. No direct connection exists between the iridic and choroidal tumor. The ciliary muscle of the left eye is more extensively invaded by the tumor than that of the right eye; at a few points only the connective tissue of the ciliary processes is somewhat infiltrated (Fig. 5).

It is remarkable in this case, that the metastatic emboli—carcinoma cells—were found in the capillaries of the choroid of both eyes, and not found in the iris. The fact that carcinoma foci are seldom noticed in the iris, may be accounted for in some cases by an early enucleation, in others by the death of the patients before the tumor had had time to advance so far. In its clinical aspect the diagnosis is confirmed by the discovery of the primary carcinoma which in all cases but three has been located in the breast. Furthermore the diagnosis is not unimportant as regards the treatment of the primary as well as of the metastatic tumor. Neither enucleation of the eye, nor an operation for the primary tumor is of any use.

Explanation of Illustrations.

FIG. 1.—Section through the right eye R and the left eye L. T = temporal half, N = nasal half.

FIG. 2.—Section through entrance of optic nerve, showing at *a* the carcinoma cells situated between the nerve fibres. R eye. Zeiss obj. AA, ocul. 4.

FIG. 3.—Post. ciliary artery in sclera, the section is somewhat oblique. Carcinoma cells are situated in the lumen. R eye. Zeiss obj. DD, oc. 4.

FIG. 4.—A part of the carcinoma of the choroid, R eye. At *a*, area of necrosis; *b*, connective-tissue stroma increasing in thickness towards the sclera. Zeiss obj. AA. ocul. 4.

FIG. 5.—Section through the iris and ciliary body of the left eye. One of the few sections in which the meridional fibres of he ciliary muscles are not recognisable.

EXCENTRIC MEDULLATED NERVE-FIBRES.

By SYDNEY STEPHENSON.

OPHTHALMIC SURGEON TO THE NORTH-EASTERN HOSPITAL FOR CHILDREN; INSTRUCTOR IN OPHTHALMOLOGY AT THE OPHTHALMIC SCHOOL, HANWELL, W.

(*With Fig. 1, Plate VI. of Vol. XXXIII., German Edition.*)

MANY years ago Recklinghausen[1] examined microscopically the eye of a painter showing a peculiar condition. With the naked eye, a sharply defined rectangular white patch was noticed post-mortem, measuring 3 *mm* vertically and 2 *mm* horizontally. It was situated in the retina, 4 *mm* from the papilla, and presented a light asbestos-like color and plainly visible striation. The microscopical examination revealed that this area was composed of axis-cylinders surrounded by myelin sheaths. In short, it was a case of medullated (opaque) nerve-fibres.

The following case is similar, and, as far as I know, the first one to have been examined with the ophthalmoscope.

Lilly F., five years old, came under my observation on November 3, 1891. There was hypermetropia of 2.5 D in each eye. In the left eye a place of a peculiar aspect is situated at about 5 papilla-diameters from the disc.

In this place one of the principal veins divides into two branches which, from the point of bifurcation towards the periphery, are enveloped for a certain distance (see figure) by a white, shining substance. The latter exhibits the usual form of opaque nerve-fibres, and seems to have compressed the veins. I have observed this anomaly for four years, during which time it has not changed.

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[1] Recklinghausen, *Arch. f. pathol. Anat. u. Physiol.*, 1864, p. 375.

CILIARY PROCESSES IN THE PUPILLARY SPACE.

By Dr. SIEGRIST, Bâle.

Translated by Dr. Arnold H. Knapp, New York.

(*With Fig. 3 of Plate VI., Vol. XXXIII., German Edition.*)

L. W., four and three-quarter years of age, on March 17, 1893, while at play was struck in the right eye by a dart. He came to the eye clinic presenting a vertical wound in the cornea and a traumatic cataract. The wound was immediately disinfected, and a part of the swollen lens-substance let out through the corneal wound.

On April 7, 1893, an iridectomy was performed in the upper-inner part, as the pupillary space was covered by the extensive corneal cicatrix. The pupillary margin of the iris was adherent to the latter, and consequently the entire iris was drawn towards the scar. Slight ciliary congestion persisted for some time.

The patient was discharged on April 20, 1893 ; the eye free from irritation. The area of the artificial pupil was partly filled with remnants of lens and capsule.

According to instructions the patient returned on July 14, 1894, for operation on the secondary cataract. The eye presented the following conditions which I have tried to illustrate by a drawing (see Fig. 3). The eye was free from irritation ; the tension normal, possibly diminished. In the temporal half of the cornea there was a large vertical cicatrix to which the iris was drawn from all sides. The artificial coloboma of the iris was situated to the nasal side, and contained the following interesting structures :

At the apex of the triangle there was a yellowish, dense membrane with several pigment spots, evidently the shrunken and thickened lens-capsule. Several reddish-brown, tapering processes occupied the base of the triangle. They extended half way to the apex, and then continued as delicate, transparent white lines to the remnants of the capsule above mentioned. In the lower part of the triangle a peripheral corneal opacity partly concealed the underlying structures.

Undoubtedly these were the ciliary processes which, together with the zonule of Zinn, had been drawn into the pupillary area by the shrinking capsule of the lens.

I have not been able to find the report of a similar condition. In Vienna, during the summer of 1894, Prof. Fuchs kindly showed me a similar though not so well marked a case. It is of practical importance in operating for secondary cataract under similar conditions to bear in mind the possibility of injuring the ciliary processes.

It was impossible to alter the position of the ciliary processes by the instillation of pilocarpine, eserine, or atropine.

In the case of our patient the secondary cataract was operated upon on July 19, 1894. De Wecker's scissors were employed, the cornea collapsed, and the eye remained soft for a long time. The incision was made in the line of the zonular fibres. Ciliary congestion remained for a long time. The patient was discharged on August 2, 1894.

The eye was again examined on August 30, 1895. The ciliary processes had retracted considerably to the periphery, owing to the release of the zonular tension. The region of the artificial pupil still contains numerous delicate opacities which will probably require another operation, as projection of light is good and the eye free from irritation.

I wish to express my thanks to Prof. Pflüger, who kindly gave me permission to publish this case.

A CASE OF UNILATERAL MICROPHTHALMUS WITH COLOBOMA OF THE OPTIC NERVE.

By L. WEISS and M. GOERLITZ.

Translated by Dr. A. N. Alling, New Haven, Conn.

(*With Fig. 2 on Plate VI. of Vol. XXXIII., German Edition.*)

IN view of the rare occurrence of one-sided congenital microphthalmus a detailed report of the following case seems of interest, especially as it presents other peculiarities still more infrequent.

Henry L., now eight years old, has been under observation for a number of years. There is no history of eye disease in the family—at least no mal-formations. His mother had no sickness before or during pregnancy. He has no brothers or sisters. Immediately after birth his mother observed nothing abnormal about the eyes. When eight days old he had an inflammation in the eyes which lasted four weeks but left no trace. When the boy was three months old the mother's attention was first called by relatives to the fact that the left eye was " smaller " than the right —the palpebral fissure could not be opened as widely. Although always a delicate child, he seems perfectly healthy. The left eye has always been somewhat sensitive to light.

Status præsens—Small, slightly-built child, fairly nourished, no trace of rickets. The left side in the region of the orbit decidedly flattened. The left eye is appreciably smaller, the palpebral fissure is shorter and narrower. In looking straight ahead the upper lid covers fully one quarter of the cornea. The left eyebrow is somewhat lower and shorter and less arched. The motility in both eyes is good, but the left at times inclines to diverge. The left orbital margin is decidedly smaller in all diameters.

In 1886, Arlt stated the interesting fact that non-developed eyes could increase in size from birth. When the observations on the orbital measurements which were made in 1892 were compared with those made in 1896, it was seen that although the cornea was not changed, the growth of the microphthalmic eye was not only relatively, but absolutely, greater than in the normal eye.

The *right* eye is apparently normal in all respects. Refraction is emmetropic. The *left* eye shows a cornea evidently smaller than the right. The vertical diameter is approximately the same as the horizontal.

The Javal–Schiötz ophthalmometer gave the radius of the cornea decidedly smaller on the side of the microphthalmus. The pupil is round and nearly as large as the other; reacts to light, directly and consensually. Vision = fingers at 1.5 *m*—not improved. The field of vision is not contracted. With the ophthalmoscope the media are clear.

The left eye has excessive myopia—about 25. D. By the indirect method there is seen in the region of the papilla a large glistening white, rather sharply defined disc, appearing too large for a normal papilla. The arrangement of the blood-vessels is peculiar. They come forward in the upper part of the disc and close to the lower border, thus leaving the central part perfectly free. We have to deal then with a coloboma of the optic nerve.

In the upright image (*vd.* Fig. 2) the whitish disc appears nearly circular. On the temporal side it is provided with a conical process which is separated from the disc by a broad shining white strip forming the temporal border. In a similar way there runs, on the nasal side of the disc, a glistening white border which, like the temporal border, gradually loses itself below in a pit out of which spring a number of arteries and veins. One sees these rising sharply forward and bending rather abruptly downward over the apparently somewhat elevated edge of the disc. In the same way, in the upper part of the disc a number of vessels come perpendicularly forward, then bending sharply upward, supply the upper part of the retina. Within the central, apparently nonvascular part of the disc, there appears a round, shining spot irregularly outlined below, and just above this a number of very fine vessels can be seen by close inspection. They diverge above and lose themselves after a short course. If this bright spot can be taken for the optic disc, then these small vessels would be the rudimentary central vessels. The lower border and the greater part of the lateral borders of the disc are encircled by a pigment ring. The whole lower portion lies more deeply sunken, especially behind the lower border where the vessels come forth.

If we compare the above with previously described cases, we are impressed with the great infrequency of unilateral congenital microphthalmus and also with the rare occurrence of a uniform development of the whole eyeball with the preservation of vision, even though moderate.

From such comparisons we must exclude those cases where the microphthalmus was an accompaniment of congenital orbital or lid cysts. The origin of these cases is indefinite on account of the great difficulty in explaining these cysts which seem to require a quite different interpretation. We must also exclude all those cases where we have to deal with a phthisical globe, and those very rare ones where there is a one-sided non-development from a pressure-atrophy resulting from a congenital or later-appearing tumor of the orbit or adnexa of the eye, if there is no evidence that the microphthalmus might have been produced before or independent of the presence of the tumor.

The preservation of vision in the microphthalmic eye has only rarely succeeded on account of the presence of other complications which in themselves interfere with the sight. Manz, in his monograph on malformations of the eyes, showed that such eyes seldom had relatively good vision, and the examples of microphthalmus with normal sight are doubtful in view of the insufficient methods of examination. "Abnormally large or small eyeballs are almost always the result of disturbances in the inner construction of the globe and not, as formerly supposed, the result of previous arrest of development." In fact, simple cases of microphthalmus are of the greatest rarity. In all literature there appear only four such, accurately observed and described—three by Martin (Inaug. Dissert., 1888), while the fourth appeared in the same year in *Arch. für Ophthal.*, by Carl Hess.

The cases of Martin occurred in three consecutive generations of one family.

The high myopia in our case is interesting, since in the few cases described high hyperopia was found. This refractive condition cannot be satisfactorily explained by the above-mentioned sharp curve of the cornea alone, but it is probable that there must also be a high curve to the surfaces of the lens.

This case occurs in a well developed boy with perfect cerebral functions. The disturbance in development is wholly in the eye and the surrounding region. The microphthalmic eyeball outwardly, as well as by the ophthalmoscopic examination, particularly in the transparency of the media, is approximately normal with the exception of the coloboma of the optic nerve.

Although Deutschmann traced the origin of these malformations to an intra-uterine inflammatory process, especially sclero-chorio-retinitis, we could not accept this explanation on account of the absence of all evidences which would necessarily remain after such a process. We must rather adopt the older theory of Arlt, according to which the microphthalmus as well as the congenital coloboma stand in intimate relation to the disturbed closure of the retinal cleft—an opinion held also by Manz and lately by Hess.

The causes of such disturbances might be primarily conditioned by disturbances in the development of the brain, and with it the eye, and according to Kundrat, the failure in development which causes the microphthalmus is always primarily in the brain, "as later changes could no longer have a disturbing influence on the eye already formed." We must, however, in this case seek another cause, because disturbances in brain development are out of question on account of the nearly perfect form of the skull and the fully developed intelligence.

On the other hand, Arlt assigns the microphthalmus and the disturbed closure of the fœtal ocular cleft to causes lying in the orbit itself. Such a condition might be found in the deficient development of the bones of the left orbit, yet Manz has shown that, if such causal relation existed, we have to believe the deficient growth of the eyeball to be the occasion of that of the orbit and of the narrowing of the anterior diameter of the skull. Also the results of orbital measurements, on the one hand of one-sided phthisical globes, on the other of enlarged eyeballs, point to the fact that the form and size of the orbit are conditioned on the size of the eyeball.

In this case, the presence of the coloboma offers ground for the theory of the disturbed closure of the fœtal ocular cleft as the cause for lack of development of the globe and of the orbit, but where the underlying cause for the incomplete closure of the retinal cleft is to be found, we are unable to say on account of the absence of any other malformations.

It is remarkable that among the few cases of unilateral microphthalmus not less than three times was there present in the eye only a coloboma of the optic nerve, which in itself does not belong among the most common malformations, and this too without further cleft formation. The most of the other cases showed coloboma of the iris, ciliary body, and choroid, so that Arlt could even say, that one finds "every time" a coloboma of the iris, and perhaps of the choroid, when the non-development is not of too high degree.

Finally, in most cases of unilateral congenital microphthalmus, the other eye presents no trace of cleft formation or other disturbance of development. In only a few have coloboma of the iris and choroid been observed with the eye of normal size. The cause for unilateral, congenital microphthalmus should be sought, in most cases, less in primary disturbances proceeding from the brain, than in an orbital disturbance which prevents the normal closure of the fœtal ocular cleft.

ABSTRACTS OF THE PAPERS IN VOL. XXIX. (1894) OF THE GERMAN EDITION OF THESE ARCHIVES NOT PREVIOUSLY TRANSLATED.[1]

BY DR. WARD A. HOLDEN.

I.—SKIASCOPIC EXAMINATIONS OF SCHOOL CHILDREN.

BY DR. C. HESS AND DR. C. DIEDERICKS, LEIPSIC.

AT the suggestion of Professor Sattler we have recently examined the eyes of 1875 school children between the ages of six and fourteen years, with the skiascope devised by Hess, the eyes not being atropinized. The refraction was noted both in the vertical and horizontal meridians, and, when the astigmatism was oblique, in the principal meridians. The accuracy of the observations is indicated by the fact that when many of the children with gross errors of refraction were sent to the clinic to be re-examined for glasses the results of the two independent examinations corresponded almost exactly.

The number of emmetropes was found to vary in the various classes for girls from 20.6 % to 33.7 %, and for boys from 29.6 % to 45.5 %.[2] Astigmatism greater than 1 D varied from 8.5 % to 17.7 %. The degree of myopia increases gradually from 10 % in the VIIIth class (6th–7th year) to 32 % in the 1st class (13th–14th year). The myopia of the boys is usually a few degrees higher than that of the girls in the same class.[1] Hyperopia decreases steadily from 60 % in children from 6 to 7 years to 38 % in those 13–14 years old. The degree of hyperopia is from 5–10 % lower in boys than in the girls of the same class.

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[1] Want of space in these ARCHIVES now renders it impossible to publish full translations of even the more valuable articles of the German edition, and it is proposed henceforth to give all the German articles systematically, in abstract at least, and the important ones in more or less abridged translation.—EDITOR.

[2] These percentages are rather low, but this is explained by the fact that we excluded every case of ametropia demonstrable with the skiascope, from the emmetropic category.

The high percentage of hyperopia is also interesting, particularly as it cannot be considered a fictitious hyperopia caused by the use of atropine. The decrease of hyperopia with age is much less rapid than the increase of myopia.

In examining school children in Geneva Sulzer has found recently that in the beginning, myopia is frequently monocular, and when binocular is more excessive in the right eye. Our figures show 55.1 % of cases of anisometropia with the higher myopia in the right eye, and 44.9 % higher in the left, a difference not so striking as appears in the figures of others. In hyperopic anisometropia 51 % showed a less hyperopia in the right eye and 49 % a less hyperopia in the left. The reason for the lower refraction in the right eye is not clear.

II.—ON THE CHANGES IN CORNEAL ASTIGMATISM AFTER CATARACT EXTRACTION.

BY DR. W. DELGANOFF, ST. PETERSBURG, RUSSIA.

The so-called traumatic astigmatism is one of the unpleasant but unavoidable complications affecting the result of almost every case of extraction of cataract. The history of the matter goes back to 1864, when Donders successfully corrected the astigmatism after extraction by means of cylindrical glasses. Following him, Haase, Woinoff, Reuss, Weiss, Becker, Laqueur, Scimeni, and Swan Burnett have all busied themselves with the subject, trying particularly to determine the effect of different methods of operation upon the resulting astigmatism, and each has advanced his own theories, but none has given sufficient attention to the changes which the cornea undergoes after extraction before it assumes its final permanent cylindrical form with the stronger refracting meridian perpendicular to the section.

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[1] This percentage of myopia seems very high, but we have included also cases under 1 D. It is interesting to compare our results with those of Böttcher and Schroeter, who examined the children of the same schools ten and twelve years ago. In one case our percentage of myopia is about equivalent to that previously found, while in the second case it is much less, possibly because of the better hygienic conditions now existing which keep down the increase of myopia.

Therefore at the suggestion of Professor Bellarminoff I made repeated examinations with the Javal ophthalmometer of 20 eyes operated on for cataract.

The literature of the subject is briefly as follows: After Donders had shown that the acuteness of vision was increased by using cylindrical lenses after extraction, v. Graefe confirmed the correctness of his observation, but was inclined to believe that in the cases of resulting regular astigmatism there had previously been a corneal astigmatism compensated for by a lenticular astigmatism in the opposite sense.

Haase then examined a number of patients with cylindrical lenses and found in all his cases that the curvature of the meridian at right angles to the section had become lessened. This flattening he explained as being due to the yielding of the fresh scar under the intraocular pressure. Prolapse of iris or abnormal healing from any cause produces a greater astigmatism.

Woinoff and Reuss then examined with the Helmholtz ophthalmometer 30 eyes operated on by Graefe's method. They concluded that the amount of astigmatism depends upon the retraction of the scar and the method of operating, the linear extraction leading to better results than the flap extraction. Weiss differed with the previous writers, stating that if new tissue is deposited between the lips of the wound as the others supposed, and the lips of the wound remained in the same plane, the curvature of the meridian at right angles must be increased instead of diminished. He favoured the explanation of Becker that the lower lip of the wound riding over the upper lip allows a shortening of the vertical diameter of the cornea and thus a lessened curvature. Weiss, however, did not attempt to explain the increase in refraction in the meridian parallel to the section, nor did Laqueur, who examined a number of eyes with the Javal ophthalmometer, and who agreed on the whole with Weiss's views.

Scimeni, who also used the Javal ophthalmometer, explained traumatic astigmatism as being due to a bulging of the central portion of the wound and to the pressure of the lateral recti muscles on the eyeball, these two factors causing a flattening of the cornea in one meridian and an increase in its curvature in the other meridian.

Swan Burnett agreed with Scimeni and laid special weight on the fact that the resulting degree of astigmatism depends upon the healing process in the corneal wound.

In my own cases the cornea was measured before the operation, then from 1½ to 2 weeks after, again 3 to 4 weeks after, again 5 to 6 weeks after, and again until the results showed no further change and the final permanent astigmatism had been found.

The author's conclusions, his detailed tables being omitted, are as follows: At the first measurement after the operation the astigmatism varied from 2.–8.D, average 4.9 D. Second measurement, 0.5–7. D, average 3.6 D. Third measurement, 0.25–7. D, average 2.8 D. Last measurement, 0.5–5.5, average 2.6 D.

At the first measurement it was found that the refraction in the vertical meridian had diminished from 1.–6. D, average 2.6 D; and that the refraction in the horizontal meridian had increased from 0.25–6.5 D, average 3.2 D. At each subsequent examination there was an increasing approximation as regards both meridians to their curvature before the operation.

It was also found that with complicated wounds the astigmatism was always greater, and that in such cases the first astigmatism decreased in much less degree than in cases of normal healing.

In the author's opinion the chief causes of traumatic astigmatism are the intraocular pressure and the tonic contracture of the extrinsic ocular muscles.

III.—The Subjective Color-Perceptions caused by the Action of Certain Toxic Substances.

By Dr. RICHARD HILBERT, Lensburg, Germany.

Our knowledge of the fact that the internal use of certain substances causes colored vision is not exactly old. Szokalski, in 1842, first spoke of erythropsia after the use of the seed of Hyoscyamus niger, and Patonillet found that persons who had eaten these seeds first saw all objects red, and later scarlet-red. Similar statements have been made from time to time regarding atropine and the cognate hyoscyamine. It has also been known that the use of santonin causes one to see all objects yellow. Detailed experiments with regard to the latter drug were first made by Mari in 1883. He found that santonin caused yellow-green vision, and he stated that the physical subtraction of yellow-green from his color perception would give the true color looked at. The spectrum to his eye appeared shortened.

The author undertook similar experiments with picric acid. Two minutes after the ingestion of 0.3 of picric acid slight yellow vision appeared and lasted two hours. This was not followed by blue or violet vision. With so small a dose one cannot suppose a yellow staining of the refractive media to take place, and the altered vision must be due to central processes. White objects and human faces appeared clearly yellow. The letters on a printed page were surrounded by a yellowish zone, and the paper, of course, appeared yellow. In looking at colors it was found that all shades of green and even blue-green took on a yellow-green hue, but that other colors did not seem particularly changed excepting red, which appeared orange. The spectrum was not altered. In the fact that other colors than green were not much changed lies a difference between the effects of picric acid and of santonin.

Xanthopsia has also been noticed after the external use of chromic-acid solution, and in icterus. Violet vision has been seen once in Japan from the toxic action of an unidentified microbe.

I have recently observed two cases of chromatopsia following drug intoxications.

The first patient, a Polish Jewess, instilled five or six drops of a solution of duboisin. sulph. (0.05-10.00) for a punctate keratitis. The patient, who was anæmic and neurasthenic, soon became excited, and the pulse became bounding, and all objects appeared to her to be scarlet-red, even when the eye into which the solution had been dropped was covered, hus indicating a central disturbance. The erythropsiat passed off in half an hour.

The second patient was my six-year-old daughter, who took probably 0.12 of santonin, an excessive dose for her age. Soon after, she declared that all objects appeared grass-green. Her general condition was unchanged, and acuteness of vision and refraction were normal. The color-sense of the child is good and well trained, so that her statements can be considered reliable. It is evident that santonin has a different effect on different individuals. In many, it causes yellow vision ; in others, yellow-green vision; and in others still, green vision.

IV.—A CONTRIBUTION TO THE HISTORY OF THE OPERATIVE TREATMENT OF MYOPIA.

BY DR. FUKALA, PILSEN.

It having been stated in *Nagel's Jahresbericht* for 1892 that Vacher had removed the lens in high myopia before this had been done by Fukala, the latter devotes five pages to a polemic discussion in which he claims to have done the operation two years before Vacher and for different indications. He speaks then of the first suggestion of the operation in 1817 by Beer, and the operation of tenotomy for progressive myopia first done in 1814 by Guerin and others, and concludes with references to the few sporadic cases of extraction in myopia reported before he formally revived the operation.

V.—A CONTRIBUTION TO THE PHYSIOLOGY AND PATHOLOGY OF CORNEAL REFRACTION.

PRELIMINARY COMMUNICATION, BY DR. ADOLF STEIGER, MUNICH.

In this paper the author briefly records the results of the measurement of the refraction in the two principal meridians of a great number of eyes, and presents the deductions which may be drawn from these statistics. 500 eyes were of children between 1 and 8 years of age, 3170 eyes were of school children below 16 years, and 600 eyes were of adults, 150 of the latter being in individuals between 60 and 88 years of age.

The physiological part is as follows:

A. *Corneal Astigmatism.*—The human cornea is, as a rule, astigmatic, and the majority of the eyes of school children have the refraction of the vertical meridian about 0.78 D greater than that of the horizontal, and $\frac{7}{8}$ of the total number have an astigmatism between 0.25 and 1.25 D. Later in life the number of cases of astigmatism slightly above the average 0.78 D decreases gradually, and cases of astigmatism of 0.25 or less become relatively more frequent. Cases of astigmatism against the rule gradually become more frequent toward the seventieth year, and beyond that again become less frequent.

In a surprisingly large number of cases the corneal curvature is exactly alike in the two eyes, and in many more cases the difference is very slight. This difference, however, increases with the age of the individuals, showing that the factors leading to a change in curvature in later life do not always affect the two eyes in equal measure. In general the amount of the astigmatism is somewhat greater in women than in men.

B. *Corneal Refraction.*—The average refraction of the cornea in boys is 42.89 D and in girls 43.15 D, and nearly 60 per cent. of the corneas of the total number of school children had a refraction between 42. and 44. D. The refraction becomes gradually less with age, but at all ages the refraction of the two corneas in the great majority of cases remains alike or but slightly different, indicating that anisometropia is mostly due to different axial lengths of the eyeballs.

The greater the difference in the corneal curvature in the two eyes the greater, as a rule, is the difference in astigmatism; and it was also found that, when there was a great difference of minimal curvature in the two eyes, there was also unilateral or bilateral astigmatism of high degree, and a greater tendency toward unsymmetrical axes in the two eyes.

C. *The Axis of the Astigmatism.*—In the eyes of young people the corneal meridian of weakest curvature is in 95.7 per cent. of the cases the horizontal, in only 0.8 per cent. the vertical, and in 3.5 per cent. the oblique. The higher the astigmatism the more likely is the meridian of least curvature to be oblique.

With increasing age the meridian of weakest curvature becomes less frequently horizontal and more frequently vertical or oblique.

In 91 per cent. of individuals the meridians of weakest curvature are correspondingly horizontal or vertical in the two eyes. Next in frequency come cases of symmetrical obliquity. In only 1.5 per cent. was the meridian of weakest curvature horizontal in one eye and vertical in the other. All other positions, such for example as parallelism of oblique axes, are great rarities.

The pathological part is as follows :

A. *The Relation between Interpupillary Distance and Corneal Refraction.*—The average corneal refraction in 92 eyes of men between the ages of twenty and eighty-eight was 42.35 D, and in 137 women within the same age limits 42.95 D.

When now the men are arranged in five groups according to the interpupillary distance, and opposite each group is put its average corneal refraction, we discover a very noticeable progressive lessening of corneal refraction as the pupillary distance becomes greater, and similarly the same relations are found in the case of the women, and also in the case of school children.

B. *Astigmatism of High Degree.*—By including in our lists a number of clinic patients we obtained a total of 243 eyes with astigmatism above 2. D, in 161 individuals, the other 79 eyes having less than 2. D, of astigmatism. The average astigmatism in these 79 eyes was 1.29 D, which is much above the general average astigmatism, from which we may conclude that, when an individual has a tendency to astigmatism, both eyes are affected in most cases, though frequently in unequal degree. It is noticeable that one abnormality of the cornea is apt to be associated with other abnormalities. Thus in these 161 patients the astigmatism is the same in both eyes in only 18 %, while in general it is equal in the two eyes in more than 50%, and in 37% the axes are oblique, while in general, obliquity of axis is found only in 5.8% of cases. Furthermore, of the cases in which the axis is oblique in one eye and vertical or horizontal in the other, the amount of astigmatism is the same in only 1.5%. In these cases with astigmatism above 2. D, in which the axes are oblique, it appears that the meridian of least curvature is nasal in 75% and temporal in but 25%.

C. *Heredity in the Curvature Relations of the Cornea.*

a. Heredity of corneal astigmatism. We have endeavored when possible to examine the relatives of such individuals as had an astigmatism greater than 2. D in one eye at least, and among the 61 eyes of relatives so examined an average astigmatism of 1.68 D was found, more than double the average general astigmatism, and high degrees of astigmatism were found in a very large percentage of cases, indicating without any doubt the heredity of astigmatism.

b. The heredity of corneal curvature. It also was found that there was a family tendency to flatness of the cornea and the reverse.

c. The heredity of the direction of the axis. A marked family tendency to obliquity of axis manifested itself, and in some families even the degree of obliquity was approximately the same in several members.

The author announces that this theme will be more extensively treated of in a monograph to be published by J. F. Bergmann, Wiesbaden.

VI.—ON THE PATHOLOGY OF THE OPTIC NERVE.

By Prof. E. ADAMÜCK, Kasan, Russia.

This paper contains several clinical histories of acute optic-nerve inflammations, together with the author's ideas of classification and nomenclature of these inflammations. His first division is into general and partial neuritis of the optic nerve. The category of general neuritis includes œdematous neuritis or choked disc, and simple neuritis or the neuritis descendans of von Graefe.

The category of partial neuritis includes peripheric neuritis or perineuritis, central or axial neuritis, and focal or disseminate neuritis.

It is particularly in the author's classification of the latter category that he takes issue with other writers. In perineuritis there will be a concentric contraction of the visual field, with or without a central scotoma, according as the affection is near the ball or farther back in the orbit, the affection probably beginning always at the apex of the orbit. In axial neuritis there will be no contraction of the field, but a central scotoma, which need not necessarily be regularly oval, as Wilbrand states, but which can have various forms. In neuritis disseminata there will be early in the disease a number of small scotomata, some of which may later coalesce to form a central scotoma of irregular form. Examples of the latter form of neuritis are found in disseminate sclerosis, in which small foci of degeneration are found in the optic nerve, while the intervening tissues are unaffected.

VII.—THE LOCALIZATION OF IRON SPLINTERS IN THE EYE BY MEANS OF THE MAGNETIC NEEDLE.

BY DR. E. ASMUS, BRESLAU.

After Asmus had published an account of his sideroscope in *Graefe's Archiv*, in 1894, his attention was called to a magnetic instrument constructed for the same purpose by Léon Gérard, and demonstrated by Gallemaerts of Brussels at the Tenth International Medical Congress at Berlin in 1890. Asmus claims, however, that while the Gérard's instrument merely indicates the presence of a splinter, his instrument localizes it in one portion of the eye. He presents a table of forty cases in which the instrument was employed.

VIII.—ON THE OPERATIVE TREATMENT OF MYOPIA OF HIGH DEGREE.

BY DR. M. HORI, TOKYO.

This paper goes over the history of cataract operation in high myopia and includes detailed statistics of 15 of the total 28 cases which at that date had been operated on in Schweigger's clinic. Schweigger's indications for the operation are as follows: The far point of the eye must be at *7 cm* or less, corrected vision must be at least $\frac{6}{36}$, there must be no inflammatory intraocular complications, and the macular changes in the choroid must not be very extensive. The younger the patient the better. The tests for distant and near vision are very scrupulously carried out. It is better, as a rule, to operate on one eye only, and preferably the more myopic eye. After the operation the aphakic eye is used for distant vision, and the other is corrected for near vision. A free discision is done under antiseptic precautions, the patient is put to bed for at least two days, and atropine is used from the first day. If the eye remains free from irritation, the lens may be allowed to undergo complete absorption, which requires about six months. If the lens swells rapidly and there are symptoms of irritation or increased tension, a linear incision is made 2 or 3 *mm* above the lower margin of the cornea, and the hard parts of the lens are extruded by pressure. Soft cortical masses may be left to undergo absorption. Finally a needle operation may be required for the secondary cataract.

IX.—BILATERAL DISTORSION OF THE OUTER COMMISSURE OF THE LIDS FROM CONGENITAL SHORTENING OF THE PLATYSMA.

BY DR. RUDOLF DENIG, WÜRZBURG.

In a girl of seven, brought to the Würzburg clinic on account of a convergent squint, the region of the outer commissure on both sides stood out somewhat from the eyeball, so that a pocket was formed as large as a pea, but the lid could be promptly closed. The face on both sides presented a peculiar shrunken appearance, like that following a burn, the cheeks being sunken, and the angles of the mouth being drawn down and out. In the neck several ribbon-like tracts ran upward to the lower jaw, the ear and the mastoid, throwing the skin into folds which varied in number and arrangement with every movement of the head. This entire condition was apparently due to a congenital shortening of the platysma, whose insertion and whose relations to the muscles of the face are exceedingly variable. The author could find no case exactly similar in the literature, though two cases of congenital shortening of the platysma have been reported, one of which was cured by cutting through the skin and muscle, and having the head frequently moved during the healing.

X.—CLINICAL AND EXPERIMENTAL INVESTIGATIONS ON SUBCONJUNCTIVAL INJECTIONS AND THEIR THERAPEUTIC VALUE.

BY DR. CARL MELLINGER, BASLE.

The opinion of Waldeyer, Schwalbe, Gallenga, and others, that a direct communication exists between the subconjunctival lymph passages and the great lymph channels of the eye, caused Reymond to try subconjunctival injections of bichloride in cases of sympathetic ophthalmia, and he reported good results.

Secondi then recommended the use of subconjunctival injections of bichloride in cases of destructive corneal processes. He used bichloride solutions from 1 : 200 to 1 : 2000, together with sodium chloride, and injected a quantity varying from one third to the entire contents of a hypodermic syringe. He reported particularly good results in the treatment of hypopyon keratitis.

After the Italians thus took the matter up, the French soon became interested, as shown by a discussion in the Société française d'ophtalmologie in 1891. Motais thought that he had seen better effects, in the treatment of sympathetic ophthalmia, from the injection of bichloride into Tenon's capsule. Darier recommended the use of subconjunctival injections in various eye diseases, such as parenchymatous keratitis, specific iritis, choroiditis, retinitis, and neuritis; and Rogman and Lagrange recommended the injections in infection after extraction, in iritis and in specific irido-choroiditis. In 1892, Darier recommended injections for almost every grave disease of the eye. In his paper, Darier compared the effects of subconjunctival injections of bichloride of iodine (Pflueger), salicylate of soda, iodide of potassium, distilled water, and glycerin, stating that these latter solutions have not produced the effects obtained by using mercury. He used a 1 : 1000 solution, injecting an amount corresponding to one division of the scale on a hypodermic syringe. In severe cases doses 5 or 10 times as large may be indicated, and the injections are made every day or every second day. In obstinate cases as many as 60 injections may be required. If no effect is obtained by 10 injections, Darier regards it useless to continue the treatment.

Van Moll confirmed, in the main, the statements of other observers, mentioning the fact that adhesion between the conjunctiva and sclera remain after the injections, but that they have no significance.

Sgrosso and Scalinci, who had been able to demonstrate the favorable effect of the injections on destructive corneal processes in animals, both histologically and bacteriologically, spoke also of the adhesions between conjunctiva and sclera.

Since 1892, we had used in the Basle clinic bichloride 1 : 2000 with $\frac{1}{10}$% of sodium chloride, injecting from $\frac{1}{2}$ to the entire contents of a hypodermic syringe. But we soon found that injections of this strength caused subconjunctival inflammation, leading to circumscribed necrosis, or to extensive firm adhesions between the conjunctiva and sclera, as had been mentioned by Van Moll, Sgrosso and Scalinci. These effects, which did not seem trivial, led us to study the results of these injections on animals.

The entire contents of a hypodermic syringe filled with bichloride solution 1 : 2000 and $\frac{1}{10}$ per cent. sodium chloride was injected under the bulbar conjunctiva of a rabbit, near the insertion of the superior rectus. The upper lid became swollen and there was increased secretion, the conjunctiva was injected, the upper third of the cornea was bluish-gray, and the iris hyperæmic. The opacity of the cornea increased and hemorrhages appeared in the iris. There was then sloughing of the conjunctiva about the place of injection, and the epithelium of the upper part of the cornea was cast off. The margin of the upper lid then became wrinkled and, later, entropium developed while the opacity of the cornea remained. Microscopic examination soon after the injection revealed an extensive round-celled infiltration which underwent the connective-tissue change, obliterating the subconjunctival space.

When small quantities of a 1:4000 solution were repeatedly injected, the cicatricial shrinking of the conjunctival sac did not come on and the results were far less injurious. It was then found that the use of the weaker of those solutions in the human eye was followed by the same therapeutic results as the use of stronger solutions, while the irritation produced was much less. These results naturally cast some doubts on the specific action of the injected bichloride, since the quantity of mercury injected could have little antiseptic effect on a hypopyon keratitis for example. We therefore were led to try injections of four divisions of the syringe scale of 0.75 per cent. and 2 per cent. sterilized salt solution in cases of keratitis, iritis, and choroiditis, and the results were at least as good as those following the use of bichloride.

The 2 per cent. salt solution was found more efficacious than the 0.75 per cent., and this solution had the advantages over the bichloride of not causing pain, of not causing necrosis of the conjunctiva, and of not causing adhesions between the conjunctiva and sclera.

How then is the action of the subconjunctival injections to be explained? It is certainly not the result, as was formerly supposed, of its disinfecting power. But it must rather be regarded as altering the absorption processes in the anterior chamber and cornea. Probably the lymph current is accelerated and the infective matters are more easily carried off. If the fluid injected contains salt, which draws fluid from the tissues, its accelerating action on the lymph current must be greater.

The beneficial effect on destructive corneal processes of accelerating the lymph current is well known. A corneal ulcer usually improves at once when its base perforates, and the Saemisch operation for corneal ulcer is merely an extensive puncture of the anterior chamber, allowing the cornea to relax, and facilitating its lymph circulation. It is thus evident that paracentesis of the cornea and subconjunctival injections both act in the same manner.

Subconjunctival injections of salt solution were used as long ago as 1866 by Rothmund with the intention of clearing up the corneal opacities by means of the irritation excited by the injections.

Our conclusions may be summed up as follows:

1. The beneficial action of subconjunctival injections is, in our opinion, due to their stimulating effect upon the lymph circulation of the eye.

2. Subconjunctival injections of bichloride 1 : 2000 set up an adhesive inflammation, causing an obliteration of the subconjunctival space, and if repeatedly used are often accompanied by severe pain.

3. Subconjunctival injections of salt solutions have the same favorable therapeutic results as bichloride injections, without their ill effects.

XI.—ON SUBCONJUNCTIVAL INJECTIONS.

BY DR. G. GUTTMANN, BERLIN.

Guttman, in this paper presents quite detailed abstracts of the entire literature of the subject, treating the reports critically. He then records his own results in a number of cases. The paper concludes as follows: As to my own experience with the subconjunctival injections of bichloride, I must say that, while I have made but fifty injections altogether, in several of my ten cases marked improvement, though perhaps transient only, was evident, which, according to Darier and others, manifests itself in most cases after three or four injections. My results on the whole, however, were so little encouraging that I have given up this method of treatment entirely, and I have convinced myself that few of the case-histories reported by others really prove indubitably the favorable effect of bichloride injections. It is nevertheless desirable to experiment further with less irritating medicaments.

Unfortunately, it seems that this so hopefully adopted method of treatment is like so many others that have been advocated in too early reports, which have excited the greatest hopes, have caused much pain, have scarcely accomplished a single cure, and have not infrequently been harmful.

XII.—SYMPATHETIC INFLAMMATION FROM SARCOMA OF THE CHOROID.

By Dr. NIEDEN, Bochum, Germany.

The rarity of sympathetic inflammation from sarcoma, when the ball has not been opened spontaneously or by operative interference to allow the entrance of infective material, certainly justifies the report of a new and convincing case.

Of the 29 cases already reported, 14 (Norris, Rémy, Sal violi, Noyes, etc.) must be excluded, since either there was only irritation and not true sympathetic inflammation, or the presence of sarcoma was doubtful (Pagenstecher, Hotz). Of 12 further cases in which there was beyond a doubt sympathetic iritis or choroiditis, the same complication was found in the eye with sarcoma, yet these could not be considered pure cases since the ball had been opened by operation (iridectomy; Knapp, Berlin, Lawrence, Schüppel), or the tumor had perforated of its own accord (Milles, Steffan, Brailey), thus destroying the proof that the sarcoma itself was the cause of the sympathetic inflammation.

Only three cases are above criticism, one observed by Milles, one by Lawford, and one by Deutschmann. In Lawford's case the capsule of the ball had been perforated by the tumor, but the point of perforation was the optic nerve, and there was no external communication.

The only absolutely certain cases are those observed by Deutschmann and myself. The history of the latter is as follows:

A woman of twenty-one, previously healthy, and of healthy family, had recently suffered from chlorosis with irregularity of menstruation.

In the middle of 1892 the patient noticed a gradual disturbance of vision, and the examining oculist discovered a detachment of the inner-lower quadrant of the retina which did not undulate. Hemorrhagic foci in the vitreous led to the diagnosis of detachment in the right eye from hemorrhage due to amenorrhœa.

I saw the patient on December 8, 1892, when the condition of the retina was the same. $V = \frac{6}{60}$. Field contracted corresponding to the detachment. T N. Pupillary reaction normal. The left eye had a myopia of 1. D, and a moderate staphyloma posticum, with normal field and normal corrected vision. Only the immobility of the retina suggested tumor, while all the other physical signs and the history indicated a detachment from hemorrhage or serous exudation. The condition of the eye remained the same until July, 1893, menstruation being restored by medicinal treatment. At this time the patient returned with the statement that the right eye had been inflamed and painful for several days following a cold. When examined, a severe plastic iritis was found, with posterior synechiæ, cloudiness of media and pupillary membrane. $V = \frac{2}{60}$. The left eye was normal. Under treatment the iritis was cured, and the eye returned to its previous condition.

In November, 1893, the patient returned with a severe iritis in both eyes, more marked in the right, with posterior synechiæ, discoloration of the iris, and cloudiness of the media. R V = fingers at 12 feet. L $V = \frac{6}{15}$. R quadrant scotoma. L normal field. R + T. L T N. The detachment of the retina was more extensive and more highly elevated and uneven. It had a dark reddish-brown color.

The iritis in the left eye must be regarded as sympathetic, since it had all the characteristics of such an inflammation, and there was no cause in the eye itself for the development of a primary iritis.

The right eye was enucleated, and under inunction treatment the iritis in the left eye was cured, and in the course of four months vision was again normal.

The eyeball preserved in Müller's fluid was sent to Professor Deutschmann for examination. His report was as follows: There is a non-pigmented, richly vascular, spindle-celled sarcoma of the choroid, which has detached and displaced the retina, and has caused it to become partially atrophic.

The uveal tract exhibits signs of moderate inflammation, and the disc and neighboring retina also give evidence of inflammatory changes. In both, a few isolated and grouped cocci were found, but no micro-organisms were found in the nerve. Nevertheless, I regard the affection as of migratory origin. But whence have the micro-organisms come? I believe that after or during the development of the tumor they were deposited at this point, as in a locus minoris resistentiæ, or at a point of attraction (chemotaxis).

I believe that there can be no doubt of the sympathetic nature of the inflammation in the left eye. It has been characteristic of all these cases that the presence of the sarcoma alone has not produced the inflammation, but that this has come on after an irido-cyclitis has appeared in the first eye.

XIII.—ON LATENT DISTURBANCES OF THE OCULAR MUSCLES IN TABES DORSALIS.

BY DR. GUILLERY, COLOGNE.

One of the spots in which the pathological processes underlying tabes early localize themselves is the floor of the third ventricle and the aquæduct of Sylvius, as is shown by the frequency of early symptoms on the part of the ocular muscles, although opportunities for anatomical verification are rare. For a long time the threatening nature of diplopia without evident cause has been recognized, and the diplopia is known to frequently usher in the picture of a serious nervous disease. Yet in looking over the literature this diplopia seems not to have attracted the attention it deserves. The general clinician is accustomed to test the function of the extrinsic muscles only when the patient's complaints point directly to them, and since most of these patients do not see an oculist in the beginning, the first development of these motor disturbances has not been sufficiently studied.

It is well known that the effort to maintain binocular fixation may overcome, to a certain degree, defects in the ocular muscles, and often the remains of manifest paralysis may be made out by careful examination long after the patient has ceased to complain of diplopia. I do not refer, of course, to cases in which the patient has learned to suppress one image. It suggested itself to me to find whether the first beginnings of such affections could likewise be made out before diplopia comes on.

When we notice the frequency of the disturbances of the intrinsic ocular muscles as compared with those of the extrinsic muscles in tabes, it would seem that the anterior part of the oculo-motor nucleus is especially disposed to these affections. But every clinician looks for the Argyll-Robertson pupil, and fails to accurately test the function of the extrinsic muscles, which fact may account for the large predominance of intrinsic disturbance.

The Maddox rod seemed to me to be the best instrument for determining the heterophoria, and a number of tabic patients were examined as to sight, refraction, binocular far and near point, and finally as to the muscular balance with oblique lines of sight. It suffices to say that many patients having orthophoria in looking directly forward, were found to have exophoria or esophoria in lateral fixation, indicating slight paresis of the recti, that was sometimes not sufficiently developed to give rise to diplopia when a red glass was held before one eye.

THE INDOLENT, CREEPING, CORNEAL ULCER.

By G. HERBERT BURNHAM, M.D., Tor. F.R.C.S., Edin.; M.R.C.S., Eng.,

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A man named David P., aged thirty-five years, came to me February, 1897, with severe ulceration of the right cornea. He was evidently insufficiently supplied with food. The ulcer was rather superficial, of a dirty white color except the narrow, creeping edge, which was of a yellowish hue. It occupied two-thirds of the corneal surface, beginning at the extreme inner edge for two thirds of its circumference. Its shifting edge was markedly crescentic in shape, and its deepest cavity almost covered the pupil.

This form of ulcer is, as is known, often associated with general asthenia, of which condition the cornea is frequently a very accurate thermometer. This variety of ulcer must derive immediate benefit from treatment, or the cornea will otherwise be greatly damaged or perish. In cases where improvement does not take place, yellowish points of infiltration occur, and then perforation and its attendant evils. The form of treatment I have always adopted in these dangerous and often intractable corneal ulcers is as follows: Locally, a lotion of carbolic acid, 1 to 20, applied by being dropped, about a dozen drops every two to four hours, day and night, upon the surface of the ulcer; solution of eserine, gr. ⅛ to gr. ¼, four to six times in the twenty-four hours; quinine, gr. 3, four times daily, and bathing with warm water. During the interval a pad is placed upon the eyelids to keep them quiet, and thus aid repair. This of many forms of treatment I consider the most reliable and direct.

Besides, there is this peculiarity about the nebulous condition following the healing process where the treatment has been by carbolic acid, that absorption is relatively more rapid and complete than under any other treatment, thus leaving a clearer cornea.

When this type of ulcer is not severe I use eserine alone. The patient now under my care shows a very severe type of the ulcer, and the quick response to the treatment is very gratifying and encouraging. I have not mentioned other forms of treatment so well known, but do simply say that I consider in this variety of obstinate, creeping, indolent ulcer of the cornea, the treatment of carbolic acid and eserine locally, and quinine internally, with, of course, plenty of ordinary wholesome food, gives the quickest and best results. In thus expressing myself, I am but upholding and emphasizing the opinion given in the *American Journal of Ophthalmology*, November, 1884, in my paper therein published, entitled "The Use of Carbolic Acid in Purulent Affections of the Conjunctiva and Cornea," and still earlier in the Royal London Ophthalmic Hospital reports, when I was resident-surgeon to that institution.

A CLINICAL AND HISTOLOGIC STUDY OF A CASE OF EPITHELIOMA OF THE CORNEO-SCLERAL JUNCTION.[1]

By CHARLES A. OLIVER, A.M., M.D.,

ONE OF THE ATTENDING SURGEONS TO THE WILLS EYE HOSPITAL; ONE OF THE OPHTHALMIC SURGEONS TO THE PHILADELPHIA HOSPITAL, ETC.

(*With 3 drawings on text-plate III.*)

On the 30th of October, 1895, J. S., a sixty-nine-year-old laborer was referred to my clinic at Wills Eye Hospital by Dr. James D. Madeira of Reading, Pa. The patient stated that one year previously, without any history of traumatism, a " small pimple " appeared at the lower outer corneal border of the right eye ; the growth, which had been painlessly though slowly and steadily increasing in size, having been repeatedly cauterized by caustics for several months previous to his first visit.

As can be seen in Fig. No. 1, reproduced from a water-color sketch made at the time by Miss Margaretta Washington of this city, there was a fleshy and wart-like-looking mass about the size of a large pea, embracing an area equal to almost the lower outer quadrant of the cornea. The growth seemed to start from a broad base in the conjunctiva just beyond the corneo-scleral margin. It was highly vascular in places, and its surface, which was rough and irregular, seemed to be infiltrated with sago-like particles. Running along the base, upon the conjunctival level, there were numerous vascular twigs which connected with several engorged conjunctival vessels. The conjunctiva in this region appeared, upon careful focussing with strong illumination, to be permeated with offshoots and narrow prolongations from the growth itself.

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[1] Read before the November, 1896, meeting of the Section on Ophthalmology of the College of Physicians of Philadelphia.

The cornea beyond the area occupied by the tumor was transparent, the pupil was round, and the iris was unaffected and mobile. Intraocular tension was apparently slightly increased. The eye-ground revealed no gross changes. Vision was reduced to three-fortieths of the normal.

The left eye, with the exception of hyperopia and presbyopia, was unaffected in any way.

The patient was admitted to the hospital and the tumor-mass was removed. The involved portions of the conjunctiva were excised, the entire denuded area being lightly though effectually cauterized by heat. The scarification and cauterization were carried as far around the limbus of the cornea as there seemed to be any blood supply to the tumor-area. A few drops of a weak solution of atropine were instilled and the field of operation was covered with several turns of a roller bandage.

Two days later the entire area of denudation seemed to be covered with a thick and whitish membrane, and the burned points were granulating. The pupil was evenly and almost fully dilated. The eyeball and lids were freely mobile, and there was no pain.

Microscopic examination of some of the removed portions of the growth showed that it was epitheliomatous in character.

The patient was allowed to return home with the request to report in about two months' time.

On the 31st of January, 1896, he came back to the hospital, when it was found that the growth had assumed a size which was somewhat greater than before, and the conditions were apparently more malignant than when he was first seen. He was admitted to the hospital, and with the assistance of my colleague, Dr. George C. Harlan, every vestige of the mass was shaved from the underlying cornea and sclera with a Beer's knife, the raw surface left being situated deeply in the corneal lamella. All of the related blood-vessel stems were excised and their tips cauterized as freely as possible. During this operative procedure, as well as during the first operation, there was almost constant oozing of blood as the successive layers of the growth were excised, this at times being so pronounced that it was impossible to get any view of the field of operation. The tumor-mass itself seemed to be composed of a densely packed and friable material very similar to that seen in papillomatous formations.

The eye was dressed in the same manner as was done at the first operation.

Two weeks later, when the exposed corneal membrane became covered with thin layers of almost transparent epithelium, corrected vision rose to one-sixth of normal ($\frac{5}{30}$).

In spite of these two radical procedures the mass again recurred until, in four months' time, it had become so great in size and so angry in appearance that in spite of the good vision it was determined to sacrifice the organ.

On the 27th of May, 1896, the eye was enucleated whilst under the local anæsthetic influence of hydrochlorate of cocaine, this being necessary on account of gross organic cardiac and renal disease. The patient was very weak and feeble. During the operation he did not express any discomfiture until the optic nerve was severed, when he experienced a slight deep-seated painful sensation without the appearance of any phosphenes. The operation was performed as quickly as possible, I being assisted by my house surgeon, Dr. D. E. Esterly. All of the doubtful portions of the bulbar conjunctiva left after the eyeball had been removed, were looked over with a strong magnifying lens and freely excised, leaving only those parts that were apparently uninvolved. The patient was profoundly shocked, requiring the free use of whiskey and aromatic spirits of ammonia after the operation. The cavity was thoroughly cleansed with bichloride solution and closed with gauze, cotton, and a roller bandage.

In several days' time a deep and well-formed socket was obtained. The patient was discharged from the hospital a few days later.

At the present writing, April 1, 1897, there are no signs of recurrence.

The specimen (see Figs. 2 and 3 the originals of which were made for me by my friend and assistant Dr. George E. Gillespie) was then carefully cut by my friend, Dr. Ada Howard Audenried, of this city. Study of them shows the characteristic polynuclear cell-formation with numerous uncovered epithelial nests which at places fuse and sink into the deeper corneal and scleral layers and the surrounding tumor structures. The external epithelial layers plainly dip into the surface-fissures of the tumor-mass. After a most extended and painstaking search, no appearance of any basement membrane can be found—thus proving the epitheliomatous character of the growth.

Remarks.—From a clinical standpoint the case is most in-

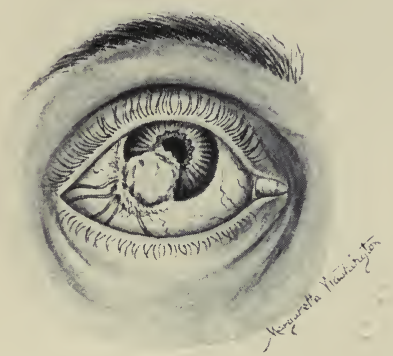


FIG. 1.

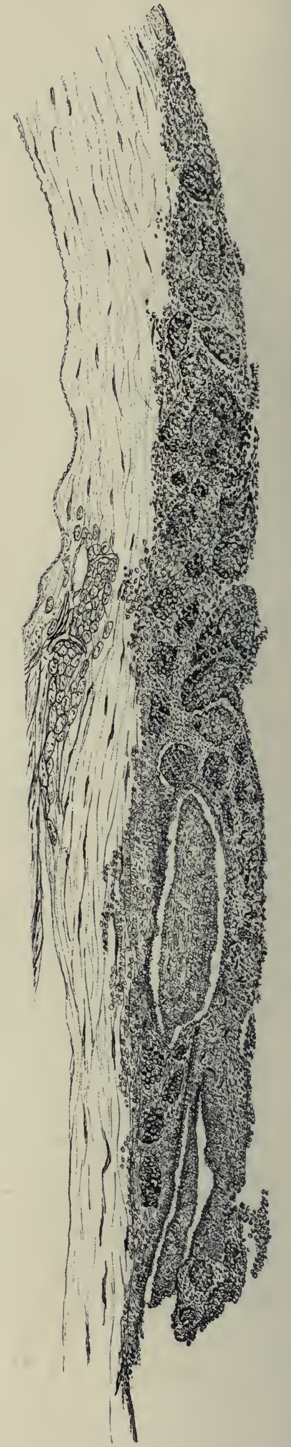


FIG. 2.

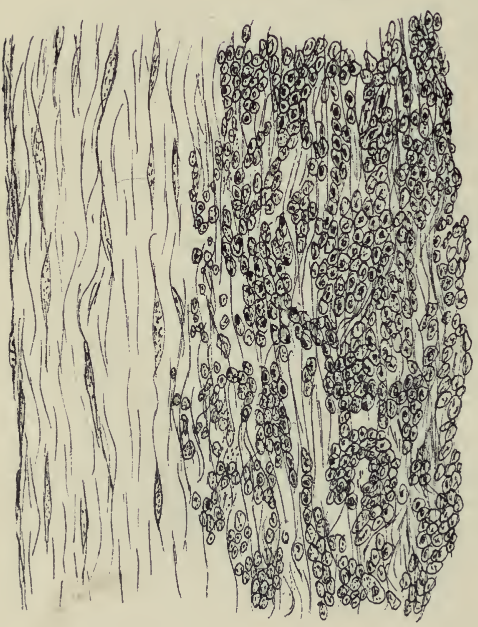


FIG. 3.

teresting. Commencing as a "pimple" in the epithelial structures of the conjunctiva at the transition-border between the cornea and sclera, as is almost universal in such cases, it gradually and painlessly increased in size until it assumed the papillomatous variety of epithelial growth. It then extended into and beneath the epithelium of the cornea far in towards the summit of the membrane. In other words, the tumor-mass evinced its development and growth in a manner that is eminently characteristic of epitheliomatous formations.

The quick recurrence and steady increase of the growth in defiance of the extreme radical measures employed for extirpation, plainly evidenced the necessity of removal of the entire field of malignancy. The almost uncontrollable oozing of blood experienced during the operative procedure plainly showed the extreme vascularity of the neoplasm.

Microscopically, the specimen is exceedingly instructive, not only by reason of presenting the characteristic appearance of epitheliomatous formation in the region involved, but upon account of the undoubted protrusion of the epithelial cells into the interlamellar corneal spaces (which possibly might have been produced or rendered more easy by the operative procedures pursued in the early stages of the disease), and the insertion of the same form of malignant cells into the superficial layers of the sclera (layers which were untouched by operation), but is also of interest in substantiating the view that the deepest penetrations of the epithelial cells into the outermost tunics of the eye are in the transition zone between the cornea and the sclera—that is, at the cornea-scleral junction.

Explanation of the Drawings on Text-plate III.

Fig. 1.—Macroscopic appearance of the tumor at the corneo-scleral junction.

Fig. 2.—Microscopic section showing position and extent of the growth.

Fig. 3.—Microscopic section showing infiltration of epithelial cells into the corneal lamellæ.

MAGNIFYING LENSES FOR USE WHEN OPERATING.

By EDWARD JACKSON, A.M., M.D.

PROFESSOR OF DISEASES OF THE EYE IN THE PHILADELPHIA POLYCLINIC SURGEON TO WILLS EYE HOSPITAL, PHILADELPHIA, PA.

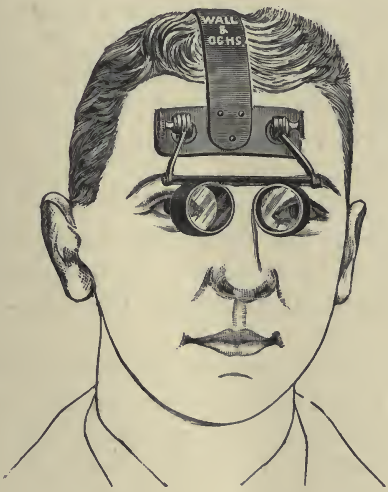
(*With one drawing in the text.*)

PROBABLY all ophthalmic surgeons have, at some time, thought of the use of strong convex lenses to assist in operating. To those who have reached that stage of maturity that brings presbyopia, something of the kind is a necessity; and for those who have not reached that maturity, a trial of the possible advantages to be gained by working with magnified images may have occupied time spent in waiting for practice.

The easy and natural attempt in this direction is made by putting a pair of strong convex lenses in a trial-frame. But working with such an arrangement, or with a pair of such lenses permanently mounted in spectacle or eye-glass frames, has proven unsatisfactory. It shuts off distinct vision beyond a certain distance, except by twisting the head to look over or under, or to one side of the glasses, and does not give sufficient magnifying power to be worth the difficulties and discomforts encountered, without bringing the surgeon's eyes too close to the eye he is operating upon.

Another method, free from most of these objections, but presenting certain others, has been to employ a strong magnifying lens, held close to the eye to be operated on. The difficulties with this are: it sacrifices binocular vision; and the holding of it must be entrusted to an assistant, or to some special support which may not sustain it in the best position just at the critical moment; or to obviate this it has been attached to a broad ring on one of the fingers of the operator. But this last arrangement limits the movements and usefulness for other purposes of the hand, and entails an additional effort of co-ordination, at the time that the operator wishes to concentrate his whole attention upon the seat of operation.

The arrangement herewith presented is designed to give the advantages of considerable magnification of the seat of operation, without the disadvantages that have rendered other attempts in this direction unsatisfactory and of little practical value. The instrument here shown consists of the binocular lenses that I have elsewhere described (*Transactions of the American Ophthalmological Society*, 1896, page 742), modified to suit the particular requirements of this use, and supported by a head-band such as is used to support the mirror for illuminating the ear and throat.



In the first place, the lenses being supported by a rigid connection with the head are perfectly controlled by the surgeon through movements of the head, movements habitually co-ordinated with the use of the eyes and executed unconsciously without, in any way, distracting his attention.

Secondly, binocular vision is secured, and its value greatly increased by the combination of lenses employed, and with no greater effort of accommodation or convergence than is required in operating under the most favorable conditions without magnifying apparatus, and with no disturbance of the normal relation of accommodation to convergence.

Thirdly, the field of vision is not interfered with. The surgeon can look above or below, or to the right or the left of the instrument, without inconvenience.

Fourthly, the full advantage of magnification is obtained without at all sacrificing convenience by bringing the surgeon's eyes too close to the eye he is operating on. In illustration of this last point, suppose one wished to get the magnifying power of a 3-inch lens placed in spectacle frames close in front of his eyes. To do this he would have to bring his face to about three inches from the eye operated on. With the form of instrument I have used the operator's eyes are six inches from the eye operated on; and it is possible to get ten or twelve inches, or any greater distance, without sacrificing the magnifying power, by lengthening the bars carrying the lenses. However, I have found six inches quite a satisfactory distance, and probably no one will find more than eight or ten inches desirable.

The proportions and dimensions that seem best are as follows: Each tube 20 *mm* long, the lens at the lower end 13 D., the prism at the upper end 15 centrads (refracting power, or degrees refracting angle), the tubes making with each other an angle of 40 degrees, the upper ends with the centres 45 *mm*. apart.

Before venturing to present the subject, I have had the instrument in actual use for some months, and have found it of more practical value than theoretical considerations had led me to expect. It has been employed in extraction of foreign bodies, curetting corneal ulcers, iridectomies, discissions for soft and secondary cataracts, curetting the lens for traumatic cataract, and cataract extraction with and without iridectomy. It is for operations similar to these that it will probably prove most useful.

There is no difficulty in employing it when one has become accustomed to it. It should be put on and completely adjusted to its proper position, in front of the eyes, before the final cleansing of the hands prior to the operation. In so far as it gives a magnified image, a good light on the seat of operation becomes of greater value.

The difficulties of learning to see through it are not very serious. Chiefly these are in the direction of mistaken judgments as to the extent of the incisions made, or of the parts removed. For instance, it is difficult to realize that you have not extracted the whole crystalline lens when perhaps only $\frac{1}{4}$ or $\frac{1}{3}$ of it has emerged from the corneal wound. Unless on his guard, the operator might make a smaller incision than he intended, without at once recognizing his error. Such difficulties may, however, be overcome without having to encounter them often in operations, by simply employing the lenses habitually to inspect the eye by oblique illumination.

In presenting this instrument I wish to express my indebtedness to Messrs. Wall & Ochs, of Philadelphia, who have made the instruments, for carefully carrying out my ideas, and for valuable suggestions as to the supporting band and the method of attaching the lenses to it.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE THIRD QUARTER OF THE YEAR 1896.

By Dr. ST. BERNHEIMER, in Vienna; Prof. C. HORSTMANN, in Berlin; and Dr. P. SILEX, in Berlin;

with the assistance of

Dr. S. M. Burnett, Washington; Dr. Dantone, Rome; Dr. Herrnheiser, Prague; Prof. Hirschmann, Charkow; Dr. P. von Mittelstädt, Metz; Dr. Sulzer, Geneva; Dr. L. Werner, Dublin; Dr. C. H. A. Westhoff, Amsterdam; Dr. Schiötz and Dr. Ole Bull, Christiania; Dr. R. Greeff, Berlin; Dr. Deus, Berlin; Prof. Da Gama Pinto, Lisbon; and others.

Translated by Dr. Ward A. Holden.

Sections I.–V. Reviewed by Dr. ST. BERNHEIMER.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS. STATISTICAL REPORTS.

367. Iwanowsky. Reports from ophthalmic practice in the country. *Wjest. Ophth.*, 1896, No. 4–5.

368. Gunning. Annual report of the institution for eye patients in Amsterdam, 1895.

369. Snellen. Annual report of the ophthalmic hospital of the Netherlands in Utrecht, 1895.

370. Westhoff. Annual report of the ophthalmic section of the charitable policlinic in Amsterdam, 1895.

371. Czermak. Eye operations. Parts 8, 9 and 10, Carl Gerold's Sohn, Vienna, 1896.

372. Greeff. Lecture-room charts of the eye. Edited by Professor Magnus. Part X. The structure of the human retina. J. N. Kern, Breslau.

373. Ophthalmic Hospital of Cincinnati. Report for 1895.

374. Ray, J. M. Observations on the eye diseases and blindness in the colored race. *New York Med. Jour.*, July 18, 1896.

375. Bruns, H. D. Two years in a southern eye-clinic; with especial reference to disease of the eye in the negro: 4160 cases arranged in statistical tables. *Amer. Jour. of Ophth.*, July, 1896.

Iwanowsky (367) reports on 8 cases of anthrax of the lid, 3 of which were fatal; and on 70 cataract extractions with 2 failures, and on injuries of the optic nerve.

Gunning (368) treated 10,541 out-patients and 344 in-patients, making 238 operations, 45 for cataract and 49 for strabismus. Iridectomy was done 51 times and enucleation 21. The trachoma cases comprised 4.08 per cent. of the whole number, these patients being for the most part Hebrews.

Snellen (369) treated 5497 out-patients and 640 in-patients. He performed 81 cataract operations, 16 linear extractions and 114 discissions, 95 iridectomies, 5 capsulotomies and iridotomies, 51 sclerotomies, 78 tenotomies, 43 enucleations, and also various minor operations.

Westhoff (370) treated 1436 eye-patients, 268 of whom had trachoma. He performed 13 cataract operations, 6 iridectomies, 2 enucleations, 25 tenotomies, and 12 lid operations.

Westhoff.

The new parts of Czermak's (371) excellent descriptions of eye operations, treats, with his customary completeness and lucidity, of the operations on the ocular muscles and of some of the intra-ocular operations.

Greeff's (372) charts, which form the 10th part of Magnus's well-known series, offer an excellent representation of our earlier and of our present knowledge of the anatomy of the retina, which has been revolutionized by the investigations of Ramon y Cajal. The charts will be welcomed both by teachers and students.

During the year 1895, there were treated at the Ophthalmic Hospital of Cincinnati (373) 2286 patients. There were

372 operations performed, including minor, of which 12 were simple extractions and 8 combined, 10 enucleations, 13 tenotomies, 2 advancements. BURNETT.

In the 1000 cases, 579 white, 421 colored, of eye diseases tabulated by RAY (374) there were 140 cases of lid trouble in the negro but not a single case of trichiasis or entropion ; hordeolum and chalazion frequent ; phlyctenular conjunctivitis very common. The two cases of trachoma in the negro were probably folliculosis in Ray's opinion. Sixty-three cases of trachoma were noted among the whites. Corneal diseases are 40 per cent. more common among the negroes. Six cases of gumma of the iris were noted. Severe iritis and cyclitis are much more common in the negro. Cataract nearly the same in both races. Atrophy of the nerve (primary) much more common in the negro. In a tabulated statement of 39 colored inmates in the State blind asylum the cause of blindness was phlyctenular keratitis in 13, purulent ophthalmia in 7, congenital cataract in 4, iridocyclitis in 5, atrophy of nerve in 4, retinitis pig. in 1, nystagmus in 1, traumatic and sympathetic in 3, small-pox in 1 ; none from trachoma.

BURNETT.

Of the cases tabulated by BRUNS (375) 27.04 % were negroes. This ratio seems to be maintained in diseases of the lachrymal apparatus, the conjunctiva, cornea, and sclera, lens, optic nerve, and retina. In glaucoma it is 37 %, and in diseases of the iris and ciliary body, 55+ %. Diseases of the choroid is only 16+ % ; chalazion, 53+ % ; catarrhal conjunctivitis, 32+ % ; phlyctenular conjunctivitis, 40 % ; pterygium, 8 % ; trachoma only 2 % ; no case in a pure negro ; corneal ulcers and leucomata, 55+ %.

BURNETT.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

376. DE WECKER. The prognosis of ocular tuberculosis. *Ann. d'ocul.*, cxv., p. 450.

377. HESS. Pathological studies of rare congenital malformation of the eye (orbital cyst, coloboma of the lens, zonular cataract and lenticonus). *Graefe's Archiv*, xlii., 3, p. 249.

378. MEYER. Two cases of microphthalmus. *Centralbl. f. prakt. Augenheilk.*, 1896, p. 237.

DE WECKER (376) again protests against the enucleation of tuberculous eyes, supporting his opinion by the report of two interesting cases. A young boy suffered from complete tuberculous destruction of the cornea, with the formation of a large granulation nodule. In spite of the severe pain, enucleation could not be performed, since the patient was threatened with meningitis. The eye is now completely cicatrized, and but slightly reduced in size. In the second patient, a boy of five, iridectomy was done for a tuberculous iritis. The operation revealed the existence of tuberculosis in the adjoining part of the ciliary body. The consulting oculists unanimously advised enucleation, which, however, was not done. The patient, who is now twelve years old, has nearly normal vision in the eye whose enucleation was advised.

SULZER.

III.—INSTRUMENTS AND REMEDIES.

379. BERGER. On the employment of cocaine in ophthalmology. Ref. *Ann. d'ocul.*, cxvi., p. 135.

380. JUDA. The part played by the Dutch in the development of methods of cataract operation. *Nederlandsche Oogheelkundige Bydragen*, 2d edition, 1896, No. 1.

381. VEASEY, C. A. Concerning subconjunctival injections of sodium chloride *versus* mercuric chloride in various ocular diseases, with cases. *Amer. Journ. of Ophth.*, Sept., 1896.

382. OLIVER. The action of hydrobromate of scopalamine. *Amer. Journ. Med. Sciences*, Sept., 1896.

383. WILLETTS, J. E. The prismatic perimeter. *Annals of Ophth. and Otol.*, July, 1896.

JUDA (380) describes the methods and instruments used by Dutch surgeons after Daviel had described the extraction of cataract.

VEASEY (381) has tried the subconjunctional injection of a sodium-chloride solution in those cases where the mercuric bichloride has been commended, and finds it equally efficacious, and not painful. He thinks the good effects due to the unloading of the lymph channels. He has used the method with success in various forms of iritis, keratitis, and episcleritis. BURNETT.

After a series of very carefully conducted experiments OLIVER (382) finds that the scopalamine hydrobromate can bring about a complete paralysis of the ciliary muscle by a single instillation of $\frac{1}{480}$ of a gram, in twenty-three minutes. A return to the normal size of the pupil takes place rapidly (ninety-six hours). In this dose it is not dangerous. BURNETT.

Willetts (383) claims that the ordinary perimeter and all its modifications are false in principle, incorrect in practice, and thoroughly unscientific and unsatisfactory. He suggests in its place what he calls a prismatic perimeter, which consists of a cone or prismatic figure of six sides, which, held in front of the eye with its base near the cornea, will give a ring or six images of a single spot of light on the periphery of the retina at the same time. If one or more of these images are missing it shows a defect at that particular place. There may be several of these, the strongest being one of 73° 40′ angle, which throws the image to 75° from the point of fixation as it is computed in the ordinary perimeter. The spot of light may be made of any desired color, and the images on the retina being of the same color the color-fields are thus easily tested. He claims that with this instrument it is demonstrated that there is no restriction in the normal field for any color or object, and that the limitations usually ascribed to the temporal side of the retina do not exist. He suggests for practical use prisms of 70°, 60°, 50°, 40°, 30°, 20°, 10°, as being sufficient for all practical purposes. The prism or cone is fitted in a tube for its more convenient use. Burnett.

IV.—ANATOMY.

384. Bernheimer. The decussation of the optic nerves in man. *Wiener klin. Wochenschr.*, 1896, No. 34.

In the second volume of his *Gewebelehre des Menschen*, Kölliker supports the idea of the total decussation of the optic nerves, and does not mention the embryonic and pathological proof of partial decussation brought forward in 1887–1889 by Bernheimer (384), who now refers to his previous papers and adds the description of a hitherto unpublished case of unilateral atrophy which supports his previous views. There seems to be no doubt but that in every section through the upper (dorsal) half of the human chiasm quantities of uncrossed fibres are to be seen; these form no separate isolated bundle, but presumably comprise one-third or more of the total number of fibres in the nerve.

V.—PHYSIOLOGY.

385. Hoeben. On an oculo-spinal centre. *Inaug. Dissert.*, Utrecht, 1896.

386. Nesnamoff. On filtration and secretion of the aqueous

humor (from Prof. Leber's laboratory in Heidelberg). *Wjest. Opht.*, 1896, 4–5.

387. PAUSIER. A treatise on ocular electro-therapeutics, pp. 479. Maloine, Paris, 1896.

388. KÖTTGEN, ELISE and ABELSDORFF, GEORG. Absorption and decomposition of the visual purples in the vertebrates. *Zeitschr. f. Psychol. u. Physiol. d. Sinnesorganen*, xii., 3–4.

389. HESS, C. Studies in accommodation. I. Some new observations on the accommodative process. *Grafe's Arch.*, xlii., 1.

According to HOEBEN (385) enucleation of the eye is followed by the degeneration of a sympathetic centre in the spinal cord.

WESTHOFF.

NESNAMOFF'S (386) experiments on dead animal and human eyes, and on the eyes of living animals, led him to the following results: 1. Physiological salt solution filters through the chamber angle uniformly and in a definite quantity in a unit of time. 2. The filtration increases proportionately to the manometric pressure in the apparatus, *i. e.*, proportionately to the intra-ocular pressure. 3. The different rapidity of filtration in different animals depends upon the size of the anterior chamber, *i. e.*, upon the extent of filtration-surface. 4. Fluids which are not clear, and particularly such as hold insoluble matters in suspension, filter less readily and, finally, the pores of the tissues becoming stopped up, filtration ceases. 5. Pigment epithelium of the ciliary body or the posterior surface of the iris, heaped up in the anterior chamber, lessens considerably the rapidity of filtration. 6. The filtration in fresh human eyes proceeds as in fresh animal eyes, viz., regularly and proportionately to the pressure. 7. The rapidity of filtration in the living eye is equal to that in the dead eye when the pressure is the same in both. 8. The secretion of aqueous humor is proportional to the difference between the pressure in the secreting vessels and the intra-ocular pressure. 9. The secretion of aqueous humor takes place under a vascular pressure twice as great as the normal intra-ocular pressure.

HIRSCHMANN.

PAUSIER'S (387) text-book on ocular electro-therapeutics surprises one at first glance on account of its size—479 pages. And one's surprise increases in reading it to find that the matter is concisely treated, and that the book contains an extraordinary number of little known and very interesting facts. The historical part informs us that the first use of electricity dates from the year 1749. The general part includes a description of the various apparatus. The electric physiology of the eye forms the introduction to the special part, which is valuable both on account of the collected literature and on account of the author's personal experience.

Hess (389) has made observations on eyes after iridectomy and after the use of eserine, that seem to support Helmholtz's theory of accommodation, which has been attacked by Tscherning. Hess found that after the instillation of eserine the ciliary processes press perceptibly forward and inward toward the margin of the lens. The distance between the ciliary processes and the lens-margin in elderly persons becomes less after the instillation of eserine. The zonula fibres, which are often visible as fine dark straight lines in the atropinized eye, can be seen, after eserine has been used, only indistinctly or not at all. The lens which, in the normal eye, is always immobile, may become temporarily tremulous after the use of eserine.

Hess believes that the results observed after the use of eserine may be applied directly to the ordinary process of accommodation, and he is the more fixed in this opinion since he has been able to show in his own eye and those of two colleagues that during an energetic accommodative effort the lenticular reflex images move tremulously, and in one patient a very evident trembling became manifest when very near objects were fixed.

Sections VI.–XI. Reviewed by Prof. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

390. Willführ. A contribution to the statistics of the inheritance of myopia. *Inaug. Dissert.*, Kiel, 1896.

391. Pflüger. On the operative correction of high myopia. *Ann. d'ocul.*, cxv., p. 445.

392. Jansen. On the correction of high myopia by removal of the transparent lens. *Med. Aarskrift*, 1896, p. 87.

393. Schiötz. Operative treatment of myopia of high degree. *Norsk. Mag. f. Laeg.*, 1896, viii., p. 116.

394. Vacher. On the extraction of the transparent lens as a prophylactic measure against progressive myopia of high degree and detachment of the retina. *Ann. d'ocul.*, cxvi., p. 5.

395. Leers. The operative treatment of high myopia. *Inaug. Dissert.*, Freiberg i. B., 1896.

396. Stocker. The eyes of the pupils in the municipal schools of Lucerne. *Jahresber. über d. Primar- u. Secundar-Schulen der Stadt Luzern*, 1895–6.

397. Pflüger. Operative treatment of astigmatism. *Ann. d'ocul.*, cxv., p. 460.

398. Marlow. A case of epilepsy and migraine apparently depending upon eye-strain. *Med. News*, July 4, 1896.

399. Williams, C. H. The discrepancy between the astigmatism as shown by Javal's ophthalmometer and the total astigmatism by trial lenses. *Annals of Oph. and Otol.*, July, 1896.

400. Henderson, F. L. A case of acquired regular corneal astigmatism. *Ibid.*

In the out-patient department of the Kiel University eye-clinic there were, according to Willführ (390), 376 of the total 1352 myopes in whom the inheritance of myopia could be demonstrated. Among these 7 were congenitally myopic ; in 10 the grandparents were myopic ; in 15, uncles, aunts, or cousins ; in 71, brothers or sisters ; and in the rest, the parents. Myopia above 5. D is here found more frequently than in eyes without an hereditary disposition. Staphyloma or other fundus changes were found in 128 cases. In the private practice of Prof. Völckers, heredity was demonstrable in 174 cases out of a total 257.

Vacher (394) has the credit of being the first in France to practise and recommend the removal of the transparent lens in high myopia. In an historical notice preceding the report of seven new cases he states that the extraction of the transparent lens in high myopia was first described and recommended by Desmonceaux in 1776 (*Traité des maladies des yeux et des oreilles*, Paris, 1776, p. 406). Sulzer.

After describing 7 cases in which Manz had successfully removed the lens by discission and subsequent extraction in myopes under twenty-three, Leers (395) states that when carefully done the operation is one of little danger, but one having no immediate influence upon the cure of the myopia or of intra-ocular diseases caused by myopia.

Marlow's (398) case was an unmarried woman of thirty years who suffered from irregular menstruation. Has had sick headaches all her life, much severer since she was fourteen years old. She had also other attacks, epileptic in character, becoming rigid with some convulsive movements and loss of consciousness for hours. After a correction of her refraction by R + 1. ○ + 0.25

60°, L $+ 0.25 \subset\!\supset + 0.75$ 100°, the attacks ceased. This was five years ago, and there has been no recurrence.

In 100 cases of astigmatism, WILLIAMS (399) found the axis and refraction alike by Javal's ophthalmometer and the trial glasses in 36 %; axes the same with differing refraction in 13 %; axes different with refraction alike in 18 %; axes and refraction both different in 7 %; no astigmatism by Javal, but some by glasses, 4 %; astigmatism by Javal but none by glasses, 13 %. It is not stated whether a mydriatic was used in all the cases.

BURNETT.

In HENDERSON'S (400) case, an officer in the navy, twenty-nine years old, during repeated examinations through a number of years, showed a vision in each eye of from $\frac{20}{20}$ to $\frac{25}{20}$. Ten years later he found accidentally that vision in the left was not good, and an examination revealed a myopic astigmatism of 1.75 D axis 15°, with $V = 1$ with correcting glass. The ophthalmometer revealed a corneal astigmatism of 2. D. The other eye is normal still. He has been engaged for some time in coast-survey field-work, using the sextant with his right eye, keeping the left closed with forced contraction of the orbicularis. It is supposed that this pressure was influential in bringing about the change in the cornea.

BURNETT.

VII.—EYELIDS.

401. ROST. On the occurrence of vaccine pustules on the lids. *Inaug. Dissert.*, Würzburg, 1896.

402. JUDA. Epithelioma palpebræ. *Nederlandsche Oogheelk. Bydr.*, April 2, 1896, p. 48.

403. WALTERS. On entropium- and trichiasis-operations. *Inaug. Dissert.*, Kiel, 1896.

404. IWANOFF. Operations for cicatricial entropium. *Wjest. Ophth.*, 1896, Nos. 4–5.

405. HOTZ. Outlines of plastic lid surgery. *Annals of Oph. and Otol.*, July, 1896.

406. KEYSER, P. D. Grafting in epithelioma. *Ophth. Record*, June, 1896.

ROST (401) observed a vaccine pustule near the left inner canthus of a woman of thirty-seven. Keratitis developed, but the recovery was complete except for the loss of the lashes in the affected area. The patient's child, which had been vaccinated, was carried on her left arm.

After the daily use of arsenite of potassium for six months, JUDA (402) saw an epithelioma disappear completely in a woman of seventy-one. WESTHOFF.

WALTERS (403) begins with a description of the usual operations for entropium and trichiasis, and then describes the procedure used in the Kiel clinic. After ectropionizing the lid, the cartilage is cut through in its entire length and a small roll of gauze is laid on the lid above the incision. A threaded needle is then passed through a small fold of skin at the free margin of the lid and again through the skin near the upper margin of the tarsus, the thread between the two folds of skin resting on the roll of gauze. Several sutures are introduced in this way, and are then drawn up until sufficient eversion of the lid-margin is obtained, when they are knotted.

IWANOFF (404) sees annually 2500 to 3000 patients, half of whom suffer from trachoma. Iwanoff's lid-operations exceed 800. He finds that the tendency to relapse is less in operations in which the tarsus is cut through, but as no method absolutely precludes relapse, every operation should be so done that further operations can be performed.

The author considers the Snellen-Hotz operation efficacious when the tarsus is not too greatly curved. When the latter is the case relapses are frequent, and the methods of Jaesche and Panas are preferable. The author has performed his modification of Panas's operation in more than four hundred cases, with few relapses. He begins with a canthotomy or at least a blepharotomy. The tarsus is then cut almost through from the conjunctival surface on a line 1½–2½ *mm* from the lid margin. A flap of skin and muscle is then taken out higher up on the lid, and the sutures are passed first through the skin and muscle of the upper lip of the wound and through the upper portion of the tarsus, and are then passed down between muscle and tarsus, coming out among the lashes. For the lower lid Snellen's operation is regarded as the best, and for xerosis that of Rudin's.

HIRSCHMANN.

This lecture of HOTZ (405) is an elaboration, in its detailed application to cicatricial ectropion and entropion, of the following fundamental principles underlying all plastic operations on the lids: 1. A good operation must permanently remove the deformity and pressure, and restore, as far as possible, the movements of the lids. 2. The lines of incision in the lids must follow, as far as possible, the direction of the muscular bundles. 3. No cicatrices must be left, and the result must not depend upon cicatricial contraction. 4. No scars should be left to rub on the eyeballs; nor, 5, should it produce any deformity which would make a second operation difficult or impossible. In the milder forms of entropion he simply attaches the stretched skin of the lid to the upper edge of the tarsus. In more extensive cases he grooves the tarsus, and in the severe forms he, in addition, incises the lid margin and introduces skin grafts, preferably from behind the ear. In all forms of cicatricial ectropion he first frees the lid skin from its attachment to the underlying tissues, and unites it to the tarsal border. Sometimes he fills the denuded space with Thiersch grafts, but by sliding flaps of skin if it is possible even if it be cicatricial. BURNETT.

KEYSER (406) reports the history of an epithelioma of the inner canthus extending through the skin to the bone, which was excised, and after scraping the bone the denuded space was covered with a skin graft from the arm. Fifteen months after the condition was very favorable, the contraction not being sufficient to materially interfere with the movements of the lids. The goldbeater's skin is not laid directly on the graft, but a small roll of cotton is applied around the edge of the graft to protect it.

BURNETT.

VIII.—LACHRYMAL APPARATUS.

407. LAFFAY. Accessory lachrymal glands. *Annal. d'ocul.*, cxvi., p. 137.

LAFFAY'S (407) patient, a boy of twenty, who had been burned about the eye at the age of two years, presented the following condition:

The staphylomatous eye was surrounded by an extensive inflamed surface, the lids were ectropionized, and the continual secretion of tears kept up the irritation. After cutting out the upper-outer retrobulbar fold, the orbital lachrymal glands were removed through an incision along the arch of the brow. The secretion was in this way checked, and the inflammatory condition improved greatly. But in the inner-upper portion of the ectropionized upper lid numerous excretory canals could be seen, from which a clear fluid flowed continuously. These accessory glands have not been previously described. SULZER.

IX.—MUSCLES AND NERVES.

408. GLEUE. Contribution to the study of the dynamic relations of the ocular muscles. *Inaug. Dissert.*, Göttingen, 1896.

409. VALUDE. New method of muscular advancement. *Ann. d'ocul.*, cxvi., p. 112.

410. LANDOLT. Clinical observations on the surgical treatment of strabismus. *Arch. d'opht.*, xvi., 7, p. 401.

411. GUILLERY. On the amblyopia of squinting individuals. *Arch. f. Augenheilk.*, xxxiii., p. 43.

412. KUHN. On fixation with the paralyzed eye. *Beiträge z. Augenheilk.*, xxiv., p. 61.

413. FÜTTENER, GUSTAV. Paresis of ocular muscles preceding visible septic infection of tonsils, from which it originated. *Annals of Ophth. and Otol.*, July, 1896.

GLEUE (408) examined 160 individuals with reference to the dynamic relations of the ocular muscles. Among these, only 10 had ortohphoria for both distance and near, 149 had exophoria or esophoria, and 28 had hyperphoria.

VALUDE (409), in the operation of muscular advancement, divides the tendon in a longitudinal direction. The assistant seizes with forceps one angle of the tendon after it has been separated from its insertion, and the operator seizes the other free angle. The tendon is then split up a varying distance in the direction of the muscle fibres, depending upon the effect desired, and the sutures are so placed as to draw the two ends of the split tendon apart. SULZER.

LANDOLT (410) in continuing his reports describes a case of left strabismus divergens of 38° in which bilateral advancement of the internus and resection of a portion of the tendon brought about a restoration of binocular vision and normal lateral mobility and convergence. His development of the operation has been as follows: The earlier unilateral or bilateral tenotomies for strabismus convergens produced either an under- or an over-correction and also a marked diminution of convergence even when some strabismus remained. Landolt, therefore, soon gave up this operation, and only in excessive squint advanced the externus and tenotomized the internus of the deviating eye. Here also the adduction of the operated eye was very much diminished and the total effect was often slight or too excessive. The operation is not rational, since the abduction is diminished in both eyes in cases of long-standing strabismus. Therefore, Landolt advanced both externi, making a careful tenotomy of the internus of the deviating eye. But even so, secondary strabismus may develop, and the range of convergence is unnecessarily restricted. He now, therefore, resects a portion of the tendon of each external rectus and advances the muscles. This procedure, which, with a few exceptions, such as paralytic or excessive divergent squint, corrects even high degrees of strabismus, is free from the disadvantages of the other operations, and particularly the lessening of the range of convergence. It is understood that stereoscopic exercises and other accessory methods of treatment are not neglected. V. MITTELSTÄDT.

According to GUILLERY'S (411) observations, the central and peripheric vision in squinting individuals may be affected in different measure. When the acuteness of peripheric vision is reduced, it is uniformly reduced everywhere, but in many cases peripheric vision is normal in spite of central amblyopia.

FÜTTENER'S (413) patient was a man of forty-two years, who had paresis of the external rectus, loss of color-perception, dilatation of retinal veins, and reduction of vision to $\frac{20}{60}$, accompanied by considerable fever which finally eventuated in an attack of tonsillitis. These symptoms slightly improved, to be aggravated by another attack of tonsillitis in which all the branches of the third pair were involved. With the subsidence of another attack somewhat similar, all the eye symptoms disappeared entirely. BURNETT.

X.—ORBIT AND NEIGHBORING CAVITIES.

414. ROLLETT. Double mucocele of the orbits. *Ann. d'ocul.*, cxvi., p. 136.

415. COPPEZ. Cystic osteoma of the frontal sinus. *Arch. d'opht.*, xvi., 9., p. 566.

416. MORAX. Ocular disturbances observed in a case of epithelioma of the frontal sinus. *Annales d'ocul.*, cxv., p. 409.

417. DU GOURLAY. A pocket of blood in the orbit without bruit or pulsation. *Ibid.*, p. 428.

418. BAKER. Three cases of skin-grafting in the orbit. *Annals of Oph. and Otol.*, July, 1896.

ROLLETT'S (414) eighteen-year old patient had a congenital malformation of the root of the nose, which formed a hard plate 5 *cm* broad. Eight months before, two symmetrical tumors appeared at the sides of this exostosis. When punctured a mucoid fluid escaped, and the two tumors were thought to be in connection with the frontal sinus. When the sinus was opened the same thick mucoid fluid was found there. Empyema of the frontal sinus producing tumors in the upper-inner angle of the orbit, is frequent, but this mucocele of the sinus producing orbital tumors is much rarer, although both affections are to be considered grades of the same inflammatory process.

COPPEZ'S (415) patient, a laborer of nineteen, had a long, soft tumor as large as a cherry on the superior wall of the right orbit, displacing the eyeball and causing stasis in the retinal vessels. When operated upon, the tumor proved to be a cyst, which soon recurred, and at the second operation an osteoma of the frontal sinus was discovered, and it was found that the cyst consisted of mucous membrane from the sinus, which had prolapsed through the perforated wall of the orbit. V. MITTELSTÄDT.

MORAX (416) followed for three years the visual disturbances of a man of fifty-three, at whose autopsy an epithelioma was found in the sphenoidal sinus. For months the symptoms were limited to the eye. The history is as follows. Progressive decay of vision and sudden blindness without ophthalmoscopic change. Later, slight optic neuritis, ending in atrophy. Late in the disease the patient developed a purulent discharge from the nose, and pedunculated tumors appeared on the nasal mucosa, with muscular paralyses and exophthalmus. Death occured from broncho-pneumonia. Autopsy: primary epithelioma and dilatation of the sphenoidal sinus, entrance of the neoplasm into the body of the sphenoid, the optic nerves and the chiasm. Extensions of the growth passed into the orbit and antrum, and into the middle turbinated bodies. Secondary epithelioma of the frontal sinus. Broncho-pneumonia. In first looking at microscopic preparations of the neoplasm, one obtained the impression of its being a gland. There were vacuoles of various sizes lined with cylindrical epithelium in a single layer. The interior of the vacuoles was empty, or contained a granular mass, in which one could recognize desquamated epithelial cells, leucocytes and red blood corpuscles. The stroma of the growth, which was non-vascular, consisted of connective tissue of varying density. The sheaths of the optic nerves were difficult to recognize in the growth, and a fourth of the substance of the nerve had been involved. The centre of the nerve, which had remained free, was sclerosed.

SULZER.

Du Gourlay's (417) patient, a man of twenty-six, exhibited the objective and subjective symptoms of an affection of the left frontal sinus, with tumor formation in the neighboring portion of the orbit, but without signs of inflammation. The inner angle of the orbit had been injured five years before by a blow from the horn of a cow. After an exploratory aspiration, 30 *ccm* of normal venous blood were withdrawn by means of Dieulafoy's aspirator. A recurrence followed, and a radical operation was made. The mucosa of the sinus was velvety, but showed no break in continuity. Hemorrhage was slight, but lasted for a considerable time. Four months later the frontal sinus filled up with a polypoid mass, which required removal. Recovery. Sulzer.

These cases of skin-grafting on the eye by Baker (418) are as follows : 1. A sarcomatous growth at the sclero-corneal junction which was removed, taking with it a considerable amount of the corneal tissue and conjunctiva. The denuded spot was covered by a Thiersch skin-graft from the inner side of the arm. The case did nicely, the tissue smoothed down, though the original graft shrank a great deal. 2. A case of symblepharon in which the denuded space, after separation of the lid and ball, was covered with a Thiersch graft and healed well, with no return of the adhesion and good independent motion of the ball. In a man of sixty, it was necessary to remove the larger part of the upper lid and some of the lower on account of an angio-sarcoma of the upper tarsus, and with it some of the conjunctiva of the ball. The new lids were made by skin flaps with pedicles from the temples, and the conjunctiva was replaced by Thiersch grafts. In this case also good movement of the ball was obtained.

Burnett.

XI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

419. Belilowski. Sozoiodal preparations in the treatment of eye diseases. *Wjest. Ophth.*, 1896, Nos. 4, 5.

420. Hjort. Treatment of blennorrhœa neonatorum. *Norsk. Mag. f. Laeg.*, 1896, No. 8, p. 823.

421. Chibret. The geographical distribution of trachoma. *Ann. d'ocul.*, cxv., p. 452.

422. Herrnheiser. On trachoma and some affections of the conjunctiva beginning with follicle formation. *Die Praxie*, 1896, No. 19.

423. Kalt. On the employment of copious irrigations in the treatment of granular ophthalmia. *Arch. d'opht.*, xv., 8, p. 484.

424. Villard. Researches on the pathological anatomy of granular conjunctivitis. *Ibid.*, xvi., Nos. 5 and 6, pp. 299 and 366.

425. Bull, Ole. Predisposing causes of trachoma. *Centralbl. f. prakt. Augenheilk.*, 1896, p. 321.

426. Schanz. On the etiology of pseudo-membranous conjunctivitis. *Arch. f. Augenheilk.*, xxxiii., p. 224.

427. Pichler. On diphtheritic conjunctivitis. *Beiträge z. Augenheilk.*, xxiv., p. 1.

428. Steiner, L. A case of papilloma of the conjunctiva. *Arch. d'opht.*, xvi., 8, p. 50.

429. Wagenmann. Carcinoma of the conjunctiva, arising from an exenteration scar. *Zehender's Klin. Monatsbl.*, xxxiv., p. 255.

430. Terson. The therapeutic action of facial erysipelas on various ocular affections. *Ann. d'ocul.*, cxv., p. 358.

431. Stocker, S. M. A case of urticaria of the conjunctiva. *Annals of Ophth. and Otol.*, July, 1896.

432. Burnett, Swan M. The social and geographic distribution of trachoma in the United States of America. *Amer. Journ. of Ophth.*, Sept., 1896.

Belilowski (419) uses, in blennorrhœa, irrigations of 4 per cent. solution of hy-sozo-jodal or applications of a 1 per cent. vaselin salve. These preparations are also employed in the treatment of trachoma, corneal opacity and dacryo-cysto-blennorrhœa. Hirschmann.

Hjort (420) in blennorrhœa neonatorum instils weak solutions of peroxide of hydrogen several times an hour, and also a $\frac{1}{10}$ % solution of nitrate of silver four times a day. Schiötz.

Chibret (421) has arranged a statistical report of the geographical distribution of trachoma, from reports furnished by various observers in different countries. Chibret's opinion that race plays an important rôle is supported by some of the facts brought out, and is refuted by others. It is, however, positively proven that there is no absolute race immunity. The various Indian nations of Canada were decimated by diseases brought over by Europeans, but they never suffer from trachoma. For the other races the disposition to trachoma seems to differ. If the receptivity of the black race is put at 1.6, that of the white race would be 6.7, and of the Mongolian 11. Also, within the white race there are great differences. The Celts seem to be the most resistant, but their immunity is due not so much to race as to climate. The absolute elevation, however, is of slight influence. It acts, in producing immunity, in connection with the lower temperature, the moisture, and the absence of dust (Swiss plateau). The absence of trachoma in Ceylon can only be attributed to the influence of race, since trachoma flourishes under the same climatic conditions all along the coast of India. Its existence in the high villages of the Rocky Mountains is ascribed by the author to the insolation. In general the higher altitudes, and in certain conditions the sea climates, are unfavorable to the extension of trachoma. The insolation, the dryness of the air, and the heat may, however, neutralize the effect of the altitude. SULZER.

HERRNHEISER (422) speaks of the nature of follicular conjunctivitis and trachoma, considering them distinct diseases.

KALT (423) recommends his irrigations of the conjunctiva with an irrigator and a funnel introduced into the eye, previously used for blennorrhœa neonatorum, for trachomatous corneal affections also. In general affections of the conjunctiva with slight discharge, the procedure is of no value. Even when these irrigations are used the ordinary methods of treatment are not to be neglected. v. MITTELSTÄDT.

VILLARD'S (424) studies on granular conjunctivitis confirm our previous views of the structure of the granulation and increase our knowledge. The epithelium is always altered over the granulation. It becomes pavement-like; the intercellular spaces are broadened and filled with wandering cells. The granulations contain normal blood-vessels. Besides the connective-tissue framework there is a finer structureless intercellular network, apparently due to coagulation. The cells differ in size, form, and contents, but are all of mesodermic origin. The structure of the granulation is the same in its entire extent, and the central portion is not degenerated. The lymph vessels of the neighborhood pass directly into the granulation, which consists of a nodular group of uninuclear leucocytes. The granulation is transformed into connective tissue after the epithelium is lost and it ulcerates, or the transformation proceeds from the connective tissue underlying the granulation. v. MITTELSTÄDT.

OLE BULL (425) opposes the view of van Millingen that the hygienic conditions of a country, the effect of civilization, are to be considered the best safeguards against trachoma, the altitude and the predisposition of the race playing no rôles.

SCHANZ (426) records four cases of pseudo-membranous conjunctivitis, all of which recovered within a few days, three being due to trauma and one to scrofula. In all these cases bacilli were found which were not to be distinguished from the Klebs-Loeffler diphtheria bacillus. The relation of this non-virulent bacillus to the virulent one is not yet clear.

PICHLER (427) reports the cases of diphtheritic conjunctivitis recently seen in the Innsbruck University eye clinic. All sixteen cases were examined bacteriologically, and they fall into three groups. In the first group (five cases) the Loeffler bacillus was found. In the second group (seven cases) the inflammation was similar, but only other microbes were found. In the third group (four cases) the Loeffler bacillus was found on the normal or but slightly altered conjunctiva. Fever and systemic disturbances developed only in the cases in which the Loeffler bacillus was found. This bacillus without doubt stands in a causal relation to diphtheritic and membranous or croupous conjunctivitis, but in some cases other microbes play the same rôle as the Loeffler bacillus.

STEINER (428) removed from the lower retrotarsal fold of a Chinese with eyes otherwise healthy, except for the presence of traces of granular conjunctivitis, a papilloma 5–6 *mm* in diameter. Each of the tufts was composed of thick masses of conical and cylindrical epithelial cells, arranged about the branched connective-tissue supporting framework. In the latter were many dilated vessels whose walls consisted only of a layer of endothelium, and which represented the dilatation of capillaries.

V. MITTELSTÄDT.

WAGENMANN (429) reports on the case of a man of seventy whose left eye had been exenterated two years before. From the conjunctival scar a carcinoma had developed, necessitating the enucleation of the stump.

TERSON (430) saw an extensive case of lepra of the conjunctiva improve under the influence of a facial erysipelas. The lids returned to their original shape, and the nodules of the conjunctiva vanished. Six months later the lepra re-appeared, but only in one eye. SULZER.

STOCKER (431) describes a case of sudden burning and lachrymation of both eyes, which came on, without any cause referable to the eyes, at intervals, and disappearing in the course of a few hours. There was also redness, mostly uniform, of the skin of the cheeks and forehead. As the condition, on some occasions at least, followed the ingestion of strawberries, the author concludes it to be of the nature of urticaria. BURNETT.

This report of BURNETT (432) is that which was sent to Chibret as chairman of the committee appointed by the French Ophthalmological Society to collect statistics on trachoma. Letters of inquiry were sent to various oculists in all regions of the United States, asking their observation as to the frequency of trachoma among different races, the effect of altitude, employment, contagiousness, etc., a distinction being made between true trachoma and follicular conjunctivitis. Thirteen answers were received, which are printed in full. The conclusions which Burnett draws from the information thus furnished is that in the United States altitude seems to exercise but little influence on the frequency of the disease. The Jews, the Irish, and Italians are the greatest sufferers, though the American of the central region of southeastern Kentucky, West Virginia, and North Carolina forms an important element in the statistics both as to frequency and virulency. The negro is reported as being practically immune even in communities where the disease is very prevalent among the whites. Opinions are divided as to contagiousness.

433. SAUVINEAU. Recurrent keratitis from infectious dacryoadenitis. *Annal. d'ocul.*, cxv., p. 457.

434. STRAUB. Keratitis phlyctenulosa. *Nederlandsch Ooghelkundige Bydragen*, 2d Aufl., 1896, p. 47.

435. CSAPODI. A case of parenchymatous keratitis. *Ungarische med. Presse*, 1896, No. 5.

436. SCHÜTTE, S. A contribution to our knowledge of keratitis parenchymatosa. *Inaug. Dissert.*, Kiel, 1896.

437. FRANK. Contributions to the diseases of the cornea: chronic peripheric excavating keratitis, ulcus rodens, pneumococcus ophthalmia, and atypical spring catarrh. *Inaug. Dissert.*, Marburg, 1896.

438. SCHIRMER. On opacities of the cornea from folding. *Graefe's Archiv*, xlii., 3, p. 1.

439. HESS. Investigations on the development of striped opacities of the cornea. *Arch. f. Augenheilk.*, xxxiii., p. 204.

440. De Schweinitz. Concerning the repair of corneo-scleral wounds with prolapse of iris. *Ophth. Record*, June, 1896.

441. Moulton, H. Keratitis interstitialis annularis. *Annals of Ophth. and Otol.*, July, 1896.

442. Allport, Frank. Keratitis dendritica. *Amer. Journ. of Ophth.*, July, 1896.

In the case of a girl of seven, who had suffered since her third year with recurrent severe purulent inflammation of the left eye, Sauvineau (433) noticed that the accessory tear gland of the same eye was enlarged and lobulated, and that the conjunctiva covering it was bluish-red. Cultivations of the secretion of the gland showed staphylococci in pure culture. Injections of 1:1000 bichloride solution into the gland soon cured the keratitis, and was again successful in a relapse of the keratitis three months later. Since then the eye has been free from inflammation, and the accessory gland is atrophic. Sulzer.

Straub (434) discusses the predisposition of the limbus cornæ to become the seat of ulceration in phlyctenular keratitis and in many conjunctival inflammations. He seeks the cause of this predisposition in the form of the eye, there being a ring-shaped retraction at the limbus. In winking, when the anterior surface of the eye is cleansed, impurities may readily remain in this furrow, and give rise to inflammations. Westhoff.

Among 84 cases of parenchymatous keratitis Schütte (436) states that 27 patients were between one and ten years old, 40 between ten and twenty, 12 between twenty and thirty, and 5 above thirty. Iritis complicated the keratitis 20 times, æquatorial choroiditis 8 times, and choroiditis disseminata 5 times. The author believes that, excepting the tuberculous cases, all are due to syphilis, and that Hutchinson's doctrine is the only correct one.

Frank (437) reports on three cases of chronic peripheric excavated ulcer of the cornea, his account corresponding with Fuchs's description of keratitis marginalis superficialis. These develop near the corneal margin, one or more crescentic excavations arising from a marginal infiltration. The course is slow, but the permanent changes are slight. He also reports on two cases of rodent ulcer, the progress of one being checked by the use of the galvano-cautery. He further describes a case of large, flat, smooth, non-infiltrated corneal ulcer in a cachectic old man. This soon became purulent, and led to panophthalmitis. Bacteriological examination showed that the affection was probably caused by the pneumococcus.

Schirmer (438) believes with Hess that the striped keratitis after extraction, and the striped keratitis with hypopyon keratitis, are due to folding of Descemet's membrane.

On the ground of the microscopic examination of an eye which was removed after an injury, a striped keratitis having developed, Hess (439) concluded that the stripes were due to folding of the deeper layers of the cornea, the opening of the anterior chamber causing a difference in tension in the vertical and horizontal diameters, as if the cornea was compressed from the side.

De Schweinitz (440) gives his experience in the treatment of prolapse of the iris at the corneal margin, through wounds or through perforating ulcers. He has tried da Gama Pinto's method of covering the open space, after the prolapsed iris has been excised and freed from the edge of the ulcer, with a piece of conjunctiva. Once he took the conjunctival graft from the other eye. This method is to be preferred in small round ulcers. For the larger wounds or ulcers he abscises the prolapsed iris, and, after freeing the wound of iris, brings its edges together with from one to three fine sutures. Cases illustrative of both methods are given.
Burnett.

Moulton (441) reports a case of this uncommon form of keratitis interstitialis in a man of sixty-seven years. The ring was densely opaque, 1 to 2 *mm* wide, entirely surrounding the central two-thirds of the cornea. The remaining part of the cornea was clear. There was no specific taint recognized. Rheumatism, hay fever, or malaria was the probable cause. Burnett.

Allport (442) gives the history of a man thirty years of age who had a mild attack of gonorrhœal conjunctivitis, which was followed by a corneal ulceration of a distinctly dendritic type, the development of which was carefully watched. All the remedies that have been recommended were tried, and all were equally unavailing. General tonics, with atropine, hot applications, and scrubbing with alcohol and a saturated solution of boric acid seemed to assist more than anything else. Burnett.

Sections XII.–XXI. Reviewed by Dr. SILEX.

XII.—IRIS.

443. Vysin. Two cases of perverse pupillary reaction. *Casopis ceskych lé Kam*, Nos. 44–45, 1896.

444. Terson. Gummata of the ciliary body. *Annal. d'ocul.*, cxv., p. 456.

445. TERSON. Early gummata of the ciliary body. *Arch. d'opht.*, xvi., 7, p. 455.

446. HIRSCHBERG. On discolorization of the iris. *Centralbl. f. prakt. Augenheilk.*, xx., p. 257.

VYSIN (443) reports two cases in which the pupils dilated in accommodation and contracted in distant vision. One patient was a railroad conductor who suffered, after an accident, with symptoms of traumatic neurosis. The other patient exhibited this perverse pupillary reaction only during attacks of migraine, to which he was subject. The latter case was considered as proving that migraine is caused by cortical disturbances and that the pupillary reaction is also under the control of the cerebral cortex, and that when the function of the cortex is disturbed the pupillary reaction may be affected. HERRNHEISER.

TERSON (444) describes three cases of the formation of gummata in the ciliary body two or three years after infection, with a tendency to caseous degeneration and perforation of the ball. Gummata of the skin usually appear about the same time. The patients are often persons debilitated by the use of alcohol or otherwise. The gummata were mostly preceded by a non-condylomatous iritis with occlusion of the pupil. The increased pain, lower tension, and decline of sight indicate an extension of the iritis backward. The sclera then bulges and later perforates, allowing a yellowish mass to escape under the conjunctiva. In one case $V = \frac{1}{6}$ was ultimately obtained, in another sight was lost from detachment of the retina, and in a third enucleation was required. Calomel injections seem to be preferable to iodide of potassium and mercurial ointment. v. MITTELSTÄDT.

According to HIRSCHBERG (446) iron splinters in the eye usually cause a rusty discoloration of the iris in a year or two, and later a dotting of the posterior surface of the cornea with orange-colored points. This punctate deposit he has seen only with foreign bodies, never after hemorrhage, the iris in the latter case becoming green. He cannot acquiesce with v. Hippel's view that this greenish-yellow discoloration also occurs when there is a splinter of iron in the eye. A third sort of discoloration is a yellowish one due to inflammatory changes. His points were illustrated with some case histories.

XIII.—CHOROID.

447. Hofschläger. Two noteworthy cases of metastasis from choroidal sarcoma. *Inaug. Dissert.*, Greifswald, 1896.

448. Hirschberg. On the treatment of choroidal tumors. *Centralbl. f. prakt. Augenheilk.*, xx., p. 268.

449. Panas. Choroidal sarcoma in the macular region with extension in the orbit. *Arch. d'opht.*, xvi., 8, p. 460.

450. Panas. A rare tumor of the eyeball. *Ann. d'ocul.*, cxvi., p. 62.

451. Morax. Spontaneous retro-choroidal hemorrhage with external ocular hemorrhage. *Ibid.*, p. 61.

452. Vignes and Batuaud. Irido-choroiditis of uterine origin. Irido-choroiditis plastica at the menstrual periods. Chronic glandular endometritis due to staphylococci. Rapid and permanent improvement in the irido-choroiditis after curetting the uterus. *Arch. d'ophth.*, xvi., p. 449.

453. Dor, L. Pathological study of a case of congenital syphilitic (?) choroiditis with hemorrhages in the retina from thrombosis of the central vein. *Ibid.*, p. 494.

454. Meyer. On the formation of colloid excrescences on the lamina vitrea. *Inaug. Dissert.*, Griefswald, 1896.

455. Van Duyse. A contribution to the study of coloboma of the eye. *Arch. d'ophth.*, xvi., 7 and 9, pp. 432, 573.

456. Bull, C. S. Panophthalmitis, orbital cellulitis, and subdiaphragmatic abscess. Autopsy. A possible case of metastasis *Annals of Oph. and Otol.*, July, 1896.

Hofschläger's (447) first sarcoma patient, a woman of twenty-six, had several attacks of pain and loss of sight in the right eye six years before. Recently there had been exophthalmus and a brown reflex could be seen through the pupil. Exenteration of the orbit was done. The ball contained a flat sarcoma, and on the outer surface of the sclera was a large tumor. Sarcoma cells were found in the optic nerve as far back as the chiasma, and at one point a metastatic nodule had formed in the inter-vaginal space.

The second patient, a woman of thirty-nine, had had an exenteration of the ball performed six years before, and had worn an artificial eye until a short time before, when the stump became enlarged and painful. A nodular reddish-yellow tumor was seen covering the entire anterior segment of the ball. There was also a tumor as large as a cherry adherent to the bone below and external to the orbit. Exenteration of the orbit was done, and later a partial resection of the superior maxilla. Examination showed the tumor to be a sarcoma. The point of interest in this case was the involvement of the bony wall of the orbit.

HIRSCHBERG (448) reports three cases of enucleation for choroidal sarcoma in which experimental puncture had been made. If the needle is passed into a tumor pure blood is obtained, if the fluid beneath a detached retina is tapped, a fibrinous yellow liquid is obtained.

In PANAS's (449) patient, a woman of fifty, a flat elevation appeared at the posterior pole of the eye, leaving the disc free. Three years later exophthalmus and glaucoma. After enucleation a small flat sarcoma of the choroid was found and also a larger tumor external to the sclera resting on the sheath of the optic nerve. A recurrence followed the operation. The choroidal tumor was a round-celled sarcoma, while the orbital part had more the structure of an alveolar endothelioma.

VIGNES (452) treated a woman of twenty-four for a frequently recurring irido-sclero-choroiditis of the left eye, which later came on also in the right eye, simultaneously with the menses. An endometritis was discovered, and curetting the uterus brought about a permanent recovery. v. MITTELSTÄDT.

DOR (453) found in the eye of an infant dying at birth, probably of hereditary syphilis, a great number of retinal hemorrhages in the periphery, probably due to thrombosis of the central veins. In one eye there was a choroidal white patch about the disc. The choroid showed some signs of inflammation.

v. MITTELSTÄDT.

In VAN DUYSE's (455) cases there was a downward coloboma of iris, lens, and ciliary body, together with a choroidal coloboma involving the disc and macula in the right eye, and separated from a coloboma of the nerve sheath by a strip of normal choroid and retina in the left. A full microscopic description was given, with references to the literature of the subject.

BULL's (456) patient, a man of forty, was admitted for panophthalmitis of right eye in connection with orbital cellulitis, apparently of idiopathic origin, which was treated in the usual way. A few days after, symptoms of gèneral pyæmia became manifest, and soon a typical and intense form of pyæmic infection set in, which ended in death at the end of about six weeks. At the autopsy a large abscess containing twelve ounces of pus was found under the diaphragm. A small mass of tissue represented the kidney on the left side, but it had no connection with the abscess. Liver enlarged, with a perityphlitic abscess passing through the right lobe; no peritonitis. Some changes found in the chest, in heart, lungs, and pleura, but the brain was free from any considerable abnormal changes. Right eye sunken, with micrococci in its interior and in the sheath of the optic nerve throughout its whole extent. They were like the staphylococcus pyogenes. BURNETT.

XIV.—GLAUCOMA.

457. TROUSSEAU. Notes on ophthalmology. *Ann. d'ocul.*, cxv., p. 418.

Of TROUSSEAU'S (457) notes, those on the action of iridectomy in chronic glaucoma are particularly interesting. In ten cases of slowly progressive glaucoma with slight increase of tension, iridectomy was followed by an immediate more or less marked diminution of vision, and in two cases by complete loss of sight. The comparison of the two eyes of the same patient, one operated on and one not, is instructive. Of two such cases, in one vision was lost at the same time in both eyes, and in the other a year and a half earlier in the operated eye. In ten other cases operated on one eye only, the glaucoma progressed more rapidly after operation in two cases, and the acuteness of vision was diminished in all. SULZER.

XV.—SYMPATHETIC OPHTHALMIA.

458. RIVERS, E. C. A case of sympathetic ophthalmia. *Journ. of Eye, Ear, and Throat Diseases*, July, 1896.

In the case reported by RIVERS (458), a boy of eight was wounded in the left eye with a piece of percussion cap, which entered the eye through the cornea and did not involve the ciliary region. There was prolapse of iris. After some months, when the symptoms of irritation had subsided, the piece of cap was seen behind the iris and midway between the pupil and the periphery. It was removed, and the eye cleared up and gave rise to no annoyance. Four months later, eight months after original injury, there was an outbreak of iritis in the sound (right) eye, which went on steadily to total loss of sight through iridocyclitis. The injured eye was enucleated a week after the outbreak of ophthalmia in the sound eye. BURNETT.

XVI.—LENS.

459. ALBRAND. Report of 295 cases of cataract operation in Professor Schoeler's clinic in Berlin. *Arch. f. Augenheilk.*, xxxiii., 2, p. 71.

460. HIRSCHBERG. On the treatment of contaminated cataract. *Deutsche med. Wochenschr.*, No. 27, 1896.

461. FROMAGET and CABANNES. On expulsive intra-ocular hemorrhage after the extraction of cataract. *Ann. d'ocul.*, cxvi., p. 118.

462. CRAMER. A case of lenticonus posterior. *Zehender's klin. Monatsbl.*, xxxiv., p. 278.

463. DE SCHWEINITZ. Concerning the extraction of immature cataract with reports of cases. *Ophth. Record*, June, 1896.

464. MILES, H. S. A number of lens cases illustrating heredity. *Annals of Ophth. and Otol.*, July, 1896.

ALBRAND (459) states that 144 extractions were done with iridectomy and 151 without. He describes the operative procedure, and says that no attention need be paid to remaining cortical masses. The many accidents occurring in extraction without iridectomy have led to the return to the old operations. Simple extraction, 151 cases; suppuration in 2, prolapse of iris in 10, and of vitreous in 6. Combined operation, 144 cases; suppuration in 2 cases, prolapse of vitreous in 7.

By contamination cataract, HIRSCHBERG (460) means such cases as would be infected by the tear sac or conjunctiva after extraction. In blennorrhœa of the sac he neither splits the anterior wall of the sac nor extirpates it, but he cauterizes the lachrymal canaliculi, closing them near the puncture when there is merely lachrymation, and closing them down to the sac when there is marked blennorrhœa. The extraction must be put off for a month.

FROMAGET and CABANNES (461) examined two eyes in which during extraction there had been hemorrhage that could not be checked. The source of the bleeding was a ruptured choroidal vessel. SULZER.

In Cramer's (462) case the refraction through the margin of the lens was + 3. D, and through the centre — 11. D. He supposes that in fœtal life there had been an increased formation of fibres in this part.

De Schweinitz (463) reports twelve cases of immature cataract in patients from twenty-seven to seventy-five years old successfully extracted. He uses the simple, the combined method, or the preliminary iridectomy according to the requirement of the particular case. He does not favor any procedure for ripening.

Burnett.

Miles (464) gives a history of heredity of lens dislocation in a family of eight children in whom six had dislocation in both eyes. The mother was the parent affected. There were three males and three females affected ; one male and one female escaped. The luxations were mostly in the downward direction or laterally ; none directly upward.

Burnett.

XVII.—VITREOUS.

465. Pollock. A case of peculiar punctate opacity of the vitreous. *Beiträge zur Augenheilk.*, xxiv., p. 81.

Pollock (465) reports the case of a patient with obscurations of sight and haloes in the prodromal stage of glaucoma, there being visible in the vitreous a great number of light milky-colored fixed spherules of obscure origin. These were not cholesterin crystals.

XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

466. Pretori. A case of peculiar pigmentation of the fundus. *Beiträge zur Augenheilk.*, xxiv., p. 101.

467. Schlosser. On atrophy of the retina after gray degeneration of the optic nerve and after embolism of the central artery. *Inaug. Dissert.*, Jena, 1896.

468. Nuel. Alterations of the macula lutea (continuation and end). *Arch. d'opht.*, xvi., 8, p. 473.

469. Nuel. Alterations of the macula lutea. *Ibid.*, p. 479.

470. Natanson. On chorio-retinitis striata and spontaneous recovery from detachment of the retina. *Zehender's klin. Monatsbl.*, xxxiv., p. 335.

471. Ehrle. On embolism of the central artery. *Inaug. Dissert.*, Tübingen, 1896.

472. Türk. Remarks on thrombosis of the central vein, with pathological examination of a new case. *Beiträge zur Augenheilk.*, xxiv., p. 44.

473. Jensen. On some new methods of treating detachment of the retina. *Med. Aarskrift*, 1896, p. 102, Copenhagen.

474. Woodruff, T. A. A case of thrombosis of the central retinal vein. *Annals of Oph. and Otol.*, July, 1896.

Pretori (466) saw a group of whitish points about the macula resembling the changes of albuminuric retinitis, and about the disc, at ½ P D distance, a dark ring from which dark branched and anastomosing stripes ran out to the periphery of the fundus (angioid streaks). The author supposed this to be a congenital anomaly.

After stating the changes found in the retina after embolism of the central artery as described recently by Elschnig and Wagenmann, Schlosser (467) reports on the condition of the retina in a case of tabic optic-nerve atrophy. The nerve-fibre layer was almost entirely wanting, as was also the layer of ganglion cells. The inner and outer reticular and nuclear layers, the rods and cones, and the pigment epithelium were unaltered. The changes in cases of embolism are much more extensive, the two reticular layers and the inner nuclear layer being considerably reduced, due to the disturbance in nutritive supply.

In Nuel's (468) first case of retinitis circinata the macular region was occupied by a dark spot and on each side was a crescentic patch of white points, in some places isolated, in others confluent. In the second case the crescentic patches lay about a limited detachment of the retina. The detachment is preceded by an œdema of the retina. The peripheric white spots lie at the outer limits of Henle's fibrous layer, and are to be considered the transformation of albuminoid exudations. The rods and cones are normal. The process is probably not an inflammation but a degeneration due to arterio-sclerosis. Hemorrhages were not found. v. Mittelstadt.

Nuel (469), having examined the retina and nerve in a case of intoxication amblyopia, and also in cases of blindness brought on in animals by the administration of male fern, concludes that the so-called retrobulbar neuritis or intoxication-amblyopia is caused by a destruction of the ganglion cells about the macula, and a consecutive ascending simple atrophy of the nerves, to which may be added later a partial interstitial inflammation of the nerve.

v. Mittelstädt.

Natanson (470) adds another observation to those reported by Caspar. The chief characteristics of the affection are the appearance of long, narrow, white stripes and broad bands of pigment beginning near the disc, and extending out into the periphery. The entire picture owes its origin, according to the author, to a spontaneous recovery from retinal detachment.

Ehrle (471) records twenty-one cases of embolism. In fifty per cent. there were disturbances in the circulatory apparatus, and in an equal per cent. the optic nerve became atrophic. Total embolism was more frequent than partial.

After giving a résumé of the cases previously reported of thrombosis of the central vein, Türk (472) describes a case seen in a man of sixty-one. Apart from a reddened and blurred disc, and numerous hemorrhages and white spots in the retina, it was noticeable that the veins were not tortuous but rather diminished in calibre. Since no disease of the walls of the veins was found by microscopic examination, on the ground of the endocarditic changes and the irregularity of the pulse, the thrombus was supposed to be marantic. The venous disturbance led to an excessive destruction of the retina through œdema, profuse hemorrhages, and sclerotic hypertrophy of the nerve fibres. The tension was not increased.

Jensen (473) gives a résumé of the different theories and methods of treatment of detachment of the retina. After referring to Deutschmann's injection method, he describes the treatment used two years ago by Dr. Bjerrum in Hansen Grut's clinic in Copenhagen. The subretinal fluid is first aspirated, and purified air is then injected into the vitreous. The reaction was slight, and in both cases in which it was tried a marked improvement followed.

Schiötz.

Woodruff's (474) patient, a man of forty-eight, with no disease of the heart or kidneys, was troubled with temporary obscuration of vision in the left eye, lasting for an hour or so, for several days, when it became permanent, with an acuteness reduced to $\frac{20}{100}$. The ophthalmoscope revealed an enormously enlarged disc with dilated and tortuous veins, and narrow arteries with some hemorrhages. The author deems the phenomenon due to an inflammation of the central retinal vein leading to its occlusion.

Burnett.

XIX.—OPTIC NERVE.

475. STRAUB. Demonstration of three patients. *Nederlandsche Oogheelkundige Bydragen*, 1896, 2d Aufl., p. 46.

STRAUB (475). A patient with papilla alba, the arteries appearing as white cords in which, when highly magnified, a fine red line can be seen. The case was one of marked endarteritic changes. WESTHOFF.

XX.—INJURIES, FOREIGN BODIES (PARASITES).

476. SCHÜTZ-HOLZHAUSEN. On extraction of bits of iron from the interior of the eye by means of the electro-magnet. *Inaug. Dissert.*, Strassburg, 1896.

477. SCHULTES. Magnet operations on the eye. *Inaug. Dissert.*, Kiel, 1896.

478. HOOR. Contributions to ophthalmology. Four clinical reports. *Wiener med. Wochenschr.*, 34 and 35, 1896.

479. RODEWALD. Three cases of injury of the eye by a bird's beak. *Inaug. Dissert.*, Kiel, 1896.

480. WILLGEROTH. On subconjunctival rupture of the eyeball. *Inaug. Dissert.*, Jena, 1896.

481. THOMALLA. On protection against eye injuries and diseases in factory employés and stone-workers. *Allg. med. Centralzeitung*, 1896, No. 80.

482. SCHWARZ. A case of eyelash in the anterior chamber and the histological changes due to it. *Beiträge z. Augenheilk.*, xxiii.

483. LEITZ. On the phlogogenic action of silver globes when left for years in the scleral cavity after exenteration. *Inaug. Dissert.*, Jena, 1896.

484. WILLARD, L. M. Removal of a splinter of steel from the vitreous chamber with an improved magnet. *Annals of Ophth. and Otol.*, July 1896.

SCHÜTZ-HOLZHAUSEN (476) reports in detail on 46 cases from Mayweg's clinic. In 6 cases of foreign body in the anterior segment of the eye, magnet extraction was successful in 5. In 40 cases of foreign body in the posterior segment, the results differed according to the magnet used. Of the attempted extractions with Hirschberg's magnet, 30% were successful; of those with Haab's magnet, 78%. In a total of 46 cases, V = $\frac{1}{10}$ or better was secured in 10. Mayweg's method is to make a scleral incision near the foreign body, and then bring in contact with the eye a Haab magnet, which is suspended from the ceiling.

SCHULTES (477) gives an historical résumé of the literature regarding Hirschberg's electro-magnet, Haab's giant magnet, and Asmus's sideroscope. Haab recommends placing the magnet at the external wound; Schmidt-Rimpler, when the lens is uninjured, at the periphery of the iris, so that the foreign body may be drawn through the ciliary process into the anterior chamber; and Schlosser removes the foreign body through a meridional scleral incision. In two cases even Haab's magnet did not remove the foreign body.

HOOR (478) reports, first, a case of copper-splinter in the ciliary region, that was spontaneously extruded after two months, with final recovery. His second case was one of congenital aniridia and mixed nystagmus. The third was a successful attempt to prevent the readhesion of the raw surfaces in symblepharon operations. His last case was one of luxation of the lens, chronic iridocyclitis, sympathetic ophthalmia, enucleation, and recovery.

RODEWALD (479) records 3 cases of injury of the eye from a bird's beak. The remarkable fact brought out was that, although one would not consider such injuries antiseptic, recovery ensued even in the cases of severe and extensive injury.

WILLGEROTH (480), who observed 7 cases of subconjunctival rupture of the eyeball, confirmed the general opinion that such ruptures usually represent a direct, and rarely an indirect, bursting of the sclera; mostly without rupture of the conjunctiva. Hyphæma was always observed, and was often slow to be absorbed, and in 1 case was recurrent. The coloboma of the iris did not always correspond to the scleral rupture. In 2 cases the lens remained in position, in 3 it was luxated into the vitreous, and in one case it lay under the conjunctiva. In only one case was V = $\frac{1}{3}$ 3 years after the injury. Detachment of the retina followed in three cases. The prognosis as regards sight is bad.

THOMALLA (481) describes a protecting glass in which the lens is replaced by Schering's gelatoid.

In 3 patients, who had worn silver globes in the exenterated eyeballs, LEITZ (483) was able to confirm Leber's results of experiments on animals, viz., that many metals, even when aseptically introduced into the eye, eventually produce inflammation from the chemotacric action of the dissolved metal. In from 2 to 5 years, signs of inflammation and increased sensibility of the eye came on, with headache, nausea, and fever, necessitating the removal of the globe. Microscopically, evidences of recent inflammation were found, and also inflammatory membranes of much older date.

In WILLARD'S case (484) the foreign body, a long crooked piece of steel, passed into the eye through the ciliary region and lodged in the retina just below and internal to the disc, where it could be plainly seen with the ophthalmoscope. A magnet was extemporized from a three-cornered file, and the electricity from a railway dynamo. The eye was entered at the upper edge of the external section, and 12 *mm* back from the sclero-corneal margin, the progress of the magnet being watched through the pupil with a head mirror. It was removed successfully, but in 10 days a cyclitis set up, and the eye had to be removed.

BURNETT.

XXI.—OCULAR AFFECTIONS IN GENERAL DISEASES.

485. HOFFMANN. On the simultaneous development of optic-nerve and spinal-cord inflammations. *Meeting of South-Western German Neurologists and Alienists at Baden-Baden*, June 6 and 7, 1896.

486. KUHN. On some disturbances of the ocular muscles in disseminate sclerosis. *Rec. d' opht.*, 1896, p. 326.

487. KUNN, K. On ocular-muscle disturbances in multiple sclerosis. *Beiträge z. Augenheilk.*, xxiii.

488. SACHS. On secondary atrophic processes in the nuclei of origin of the ocular nerves. *Graefe's Arch.*, xlii., 3, p. 40.

489. CORREO DE BITTENCOURT. On ocular disturbances in beri-beri patients. Rio de Janeiro, 1896.

490. JANUSKIEWICZ. Two cases of puerperal septic embolism of the eye. *Centralbl. f. prakt. Augenheilk.*, xx., p. 206.

491. DE WECKER. Obstetrical ocular lesions. *Ann. d'ocul.* cxvi., p. 46.

492. HÜBNER. Three cases of ocular disease in ichthyosis hystrix. *Beiträge zür Augenheilk.*, xxiii.

493. FRANKE. A case of acromegaly with temporal hemianopsia. *Zehender's klin. Monatschr.*, xxxiv., p. 259.

494. PICK. On hemianopsia in uræmia. *Prager med. Wochenschr.*, 1895, No. 45.

495. BOSSOLINO. On hemianopsia and unilateral ophthalmoplegia of vascular origin. *Neural. Centralbl.*, xv. p. 626.

496. ARMAIGNAC. Bi-temporal hemianopsia, double atrophy of the papilla ; tuberculosis of the base. *Ann. d'ocul.*, cxv., p. 471.

497. BRÜCKNER. A case of bilateral homonymous hemianopsia, with preservation of a small visual field, following a complicated fracture of the skull in the occipital region. *Inaug. Dissert.*, Giessen, 1896.

HOFFMANN (485) reports three cases of blindness and paralysis of the legs. A man of forty-eight, grew blind within a few hours and died ten weeks later. The autopsy showed retrobulbar neuritis and disseminate myelitis. A woman of fifty-six, grew blind within a week with optic neuritis. On the 14th day there came on motor and sensory paralysis of the legs, and paralysis of the bladder and intestines. The autopsy revealed transverse dorsal myelitis. These cases may be called ancephalomyelitis disseminata.

KUNN (487) has found some new eye symptoms in multiple sclerosis. The first in an inability to rapidly fix a new object, the eyes alternately converging for a nearer and a farther point, due to the fact that the synergetic action of the internal recti is not carried out with the necessary precision. Second, he mentions a strabismus due not to paralysis but to a disturbance of co-ordination in the extrinsic muscles. Third, he speaks of anisocoria. He several times observed a sudden dilatation of the pupil following the irregular twitching motion described by Parinaud.

SACHS (488) records these observations. 1. A case of exenteration of the orbit for glioma in a child aged two years. Death two months later. 2. Paralysis of the abducens in a man of eighty-three with two fungi of the dura mater. 3. Recurrent paralysis of the abducens in a woman of sixty-two. The consecutive atrophy of the nerves and the cerebral nuclei was especially studied.

DE BITTENCOURT (489) after a long experience with beri-beri in Brazil, speaks of the ocular-muscle paralyses, which are usually of short duration. His conclusions as to the visual disturbances are as follows : In beri-beri neuritis, only the periphery of the nerve is affected (peri-neuritis). Occasionally there may be some hypertrophy of the interstitial connective tissue. The complete restoration of vision even after long-continued amaurosis, and the lack of fatty degeneration and atrophy of the nerve-fibre bundles, indicate that the affection is not a parenchymatous or axial neuritis. In amaurosis and amblyopia, the swelling may affect the optic nerves alone, or also the chiasm, tracts, and visual centres.

JANUSCKIEWICZ (490) reports on a case of unilateral and one of bilateral metastatic embolism in puerperal fever. Both patients lived.

DE WECKER (491) reports the case of a new-born infant whose left orbit was emptied by the finger of the obstetrician, who thought that his finger was in the infant's mouth. A more frequent accident is muscular paralysis caused by the forceps. The external rectus is usually the muscle affected. The condition is not noticed until the infant is older, when a convergent squint is observed which, as most infants are hyperopic, is taken to be a convergent squint due to hyperopia.

It is also probable that the forceps plays a certain rôle in the production of congenital ptosis.

De Wecker has seen three cases of corneal opacity caused by the direct pressure of the forceps, the diagnosis being made possible by the pressure-mark left on the forehead. These opacities clear up spontaneously. SULZER.

HÜBNER (492) records three cases showing that ichthyosis may cause ectropium of the lower lids by shrinking of the skin, and that it may also cause shrinking of the conjunctiva and obstinate keratitis.

FRANKE'S (493) patient, a woman of thirty-one, soon after cessation of the menses, noticed diplopia and an increase in the size of the face, feet, and hands. These parts continued to grow so that three years later the clinical picture of acromegaly was well marked and bitemporal hemianopsia developed. Two years later there were thickening of the lids, and paralyses of the right internal and inferior recti. R V = $\frac{8}{10}$, L V = $\frac{7}{10}$. Sharp bitemporal hemianopsia without hemianopic pupillary reaction. Atrophy of the optic nerves. Thyroid tablets had no effect, but beef hypophyses caused a subjective improvement. The decay of vision is due to disease of the hypophysis, and vision is usually completely lost.

In an old nephritic patient, Pick (494) found uræmic amaurosis with preserved pupillary reaction. After the amaurosis had lasted one day, there was left hemianopsia. At the autopsy a focus of softening was discovered in the cortex at the outer side of the second occipital convolution. The uræmic poison was supposed to have caused coagulation within the vessels, producing a circumscribed softening.

Brückner (497) records a case of bilateral hemianopsia in a miner of twenty-one, who was struck with a stone in the occipital region. The skull was fractured, and the patient became entirely blind. A month later $V = \frac{6}{6}$. An examination of the field revealed in the right eye a total defect of the temporal half and of the inferior nasal quadrant, and in the left eye of the nasal half and the inferior temporal quadrant. There were no disturbances of color-sense or of orientation. In most of the cases previously reported the hemianopsia was at first unilateral and later bilateral, indicating two distinct lesions. In this case the hemianopsia was bilateral from the beginning, indicating an affection of both central optic paths by the single injury. As in the other cases, the point of fixation was free in this case, and central vision was therefore normal. For this reason most authors have accepted the view of Forster, who believed the preservation of the point of fixation to be due to a particularly favorable vascular supply to the point of sharpest vision in the occipital cortex, in opposition to Sachs, who claimed that each hemisphere stands in relation with the entire macula.

BOOK NOTICES.

I.—**Die Farbenblindheit u. ihre Diagnose** (Color-Blindness and its Diagnosis). For Physicians and Officials. By Dr. M. OHLEMANN, Eye Surgeon in Minden, Germany. Braunschweig: J. H. Meyer, 1897. Bound, 50 cents.

This brochure of 18 small-octavo pages is a short presentation, entirely for practical purposes, of the nature and diagnosis of the defects in color-perception. It contains a very well executed colored plate of the distribution of colors in the spectrum, as perceived, 1, by the normal eye; 2, by the so-called red-blind; 3, by the so-called green-blind; 4, by the totally color-blind; showing graphically the defects in the different varieties of color-blindness, compared with the normal spectrum. The spectrum of the totally color-blind is composed of the shading of white and black, being white near the centre, the part of greatest brightness in the spectrum, from which it grows progressively darker towards both ends. Red- and green-blindness are the common defects; blue-yellow blindness may, as a rule, be omitted, as it occurs only extremely seldom, and the results of the examination of it have not proved uniform. The different methods of examination are briefly but clearly described. The author thinks that Daae's plate and Seebeck's test with worsteds, or a modification of it, as by Holmgren or Thomson, are sufficient for all practical purposes.

H. K.

II.—**A Handbook of Diseases of the Eye and their Treatment.** By HENRY R. SWANZY, Dublin. Sixth Edition. Phila.: P. Blakiston, Son, & Co. From the sixth English Edition (London: H. K. Lewis). Price, $3.

Swanzy's text-book has been carefully revised. To gain space the description of "some elementary optics" has been omitted. The ocular manifestations in focal and diffuse diseases and injuries of the brain and spinal cord, and the functional diseases of the eye, further the diseases of the orbit and neighboring cavities, have received greater attention than before. Swanzy's book deserves its continued popularity. H. K.

III.—**Klinischer Leitfaden der Augenheilkunde** (Clinical Guide of Ophthalmology). By JUL. V. MICHEL, Prof. WÜRZBURG. Wiesbaden: J. F. Bergmann, 1897.

In three years a second edition has been necessary. It is increased by 34 pages, carefully revised, and brought up to date. It contains in its compact form an unusually thorough presentation of the present status of ophthalmology both in its scientific and practical aspects.

The reviewer, not a novice in eye surgery, is delighted with the concise style of the author and the extent of information his book imparts in so small a compass. He has, however, his doubts whether such condensation is the best thing for a beginner. What the adept comprehends at a glance, may be hard labor for the tyro. More elaboration of description, and demonstrations illustrated by drawings, would, in our opinion, have assisted the student greatly, even if the book were exclusively designed to supplement the all-important clinical teaching. H. K.

IV.—**Technique de l'Exploration Oculaire; Introduction à l'Étude de l'Ophtalmologie.** Par L. VIGNES. Paris: A. Maloine, 1896.

Vignes's book of 418 octavo pages, with 213 figures in the text, is an excellent introduction to a thorough, scientific study of ophthalmology. It treats in an elementary way, but with sufficient detail, of the preliminary branches of ophthalmology, namely:

1. Anatomy of the visual organ, including embryology.

2. General and special physiology of the eye. Physical and physiological optics are exhaustively and clearly presented. The methods of functional examination are well described. The diagnosis of the anomalies of refraction and motility is based on the application of theoretical knowledge to the requirements of practice. The book is warmly recommended to all those that know French. The style is clear and easy. H. K.

V.—**Augenärztliche Unterrichtstafeln.** Edited by Prof. H. MAGNUS. (Plates for Ophthalmological Instruction.) No. X. The Structure of the Human Retina. By Dr. RICH. GREEFF Berlin. Breslau: I. U. Kern, 1896.

The plates, with a didactic exposition of the subjects they illustrate, edited by Prof. Magnus, are very valuable for students and teachers. The last of the ten numbers that have appeared thus far is particularly opportune. The structure of the human retina has received a new impetus by the remarkable discoveries which the recent methods of microscopic research by Ehrlich, Golgi, and Rámon y Cajal have made possible. The monograph of Dr. Greeff presents the actual status of the histological anatomy on 4 plates and 19 pages of text, systematically arranged. It will certainly be welcome to many of our readers who, as the reviewer, want to inform themselves of the scientific progress in this field. In the large plate Dr. Greeff places the earlier description of the retina by Hy. Müller and Max Schultze at the side of the recent description by Rámon y Cajal, so that we readily notice what has been modified and added by the brilliant researches of the ingenious Spanish investigator. After a short description of the topographical anatomy of the retina, the author traces the course of the rays of light through the depth of the retina according to the knowledge obtained by previous and recent researches. Then he gives a detailed description of each retinal layer. After that he describes the sustentacular tissue, the macula lutea and fovea centralis, the peripheric (ora serrata, ciliary and iridic) parts, and the vessels of the retina.

Particularly interesting and clearly illustrated by the large Plate I. are the three sets of neurons (independent nerve formations), which, according to Rámon y Cajal, transmit the light impression from one set to the other through contact of its terminal (dendritic) structures, not through an uninterrupted nerve fibre, which has so long been sought for in vain. H. K.

Contents of the Newest Number of the Arch. für Augenhk.

Vol. XXXIV., No. 2 (3 plates and 7 text-figures). Issued February, 1897.

VI. L. Bach. Bacteriological investigations on the influence of antiseptic applications on the pressure of germs at the edges of the lids and in the conjunctival sac.

VII. Liebrecht. On physiological and hysterical diplopia.

VIII. N. Andogsky. On the ganglion cells in the iris.

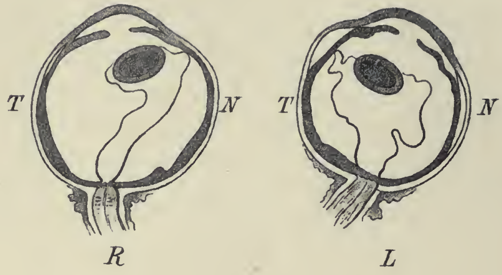
IX. C. Grunert. On the tuberculosis of the conjunctiva.

X. W. Goldzieher. Hutchinson's alteration of the background of the eye (Retinitis circinata, Fuchs).

XI. H. Gifford. Fränkel's pneumonia diplococcus a frequent cause of acute conjunctival catarrh. (Translated by the author from the English edition.)

Systematic report on the progress of ophthalmology during the 3d quarter of 1896. Translated in this number.

Fig. 1.



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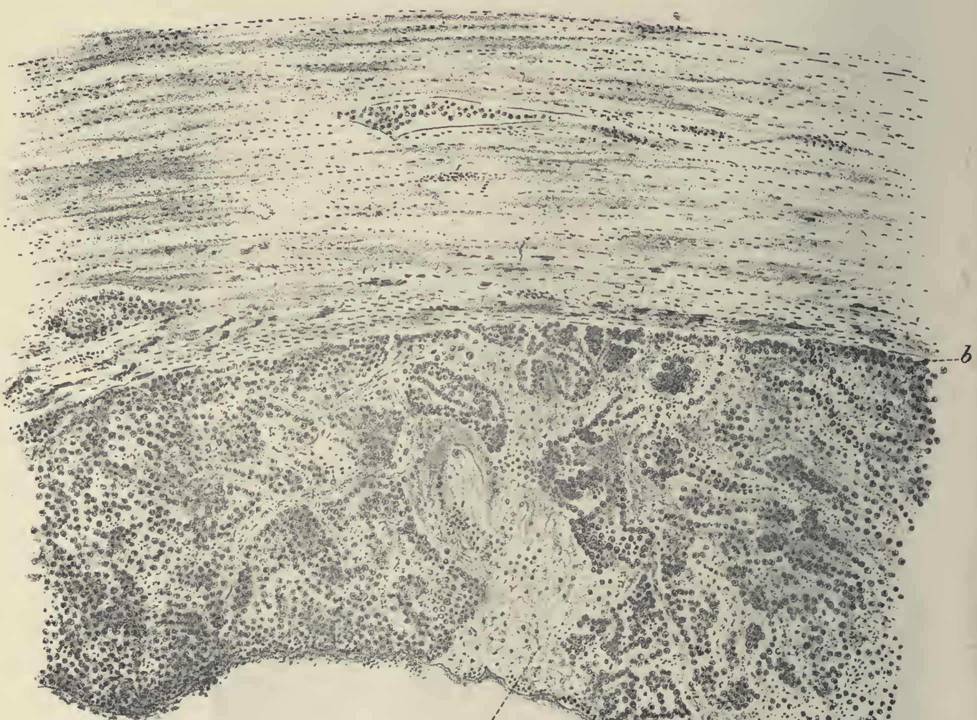

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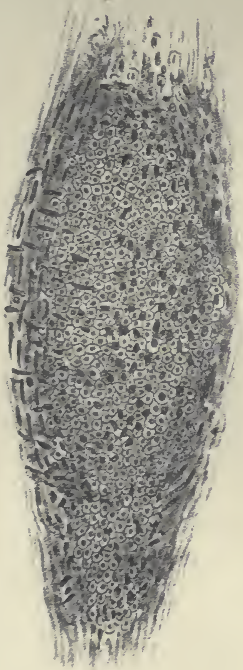

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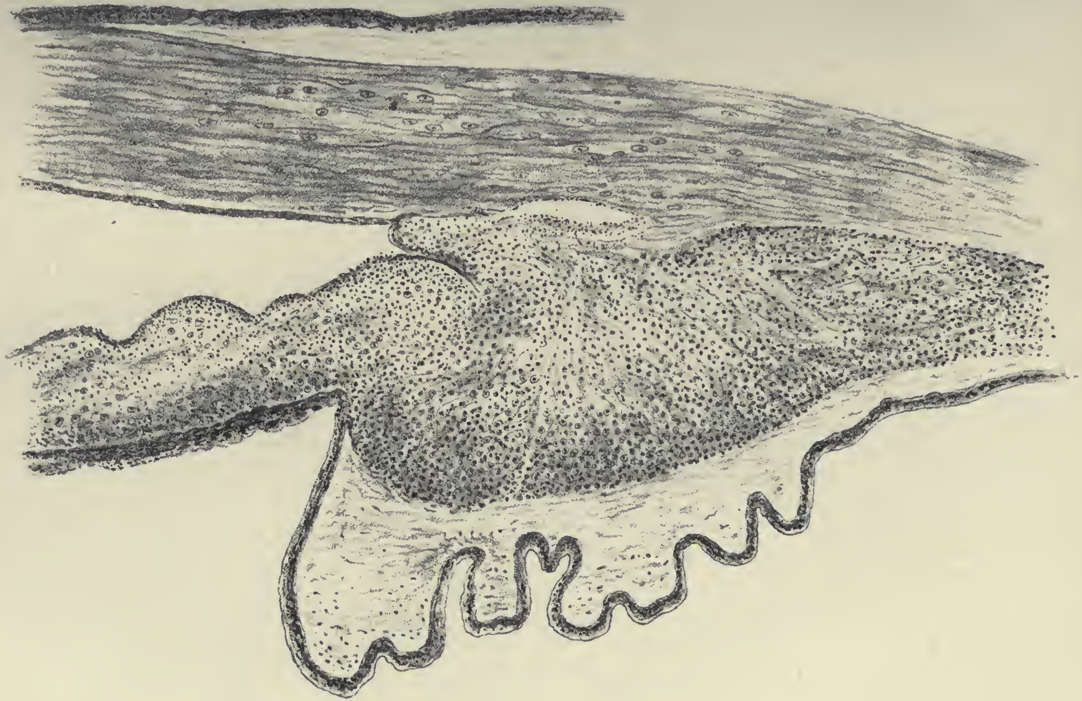

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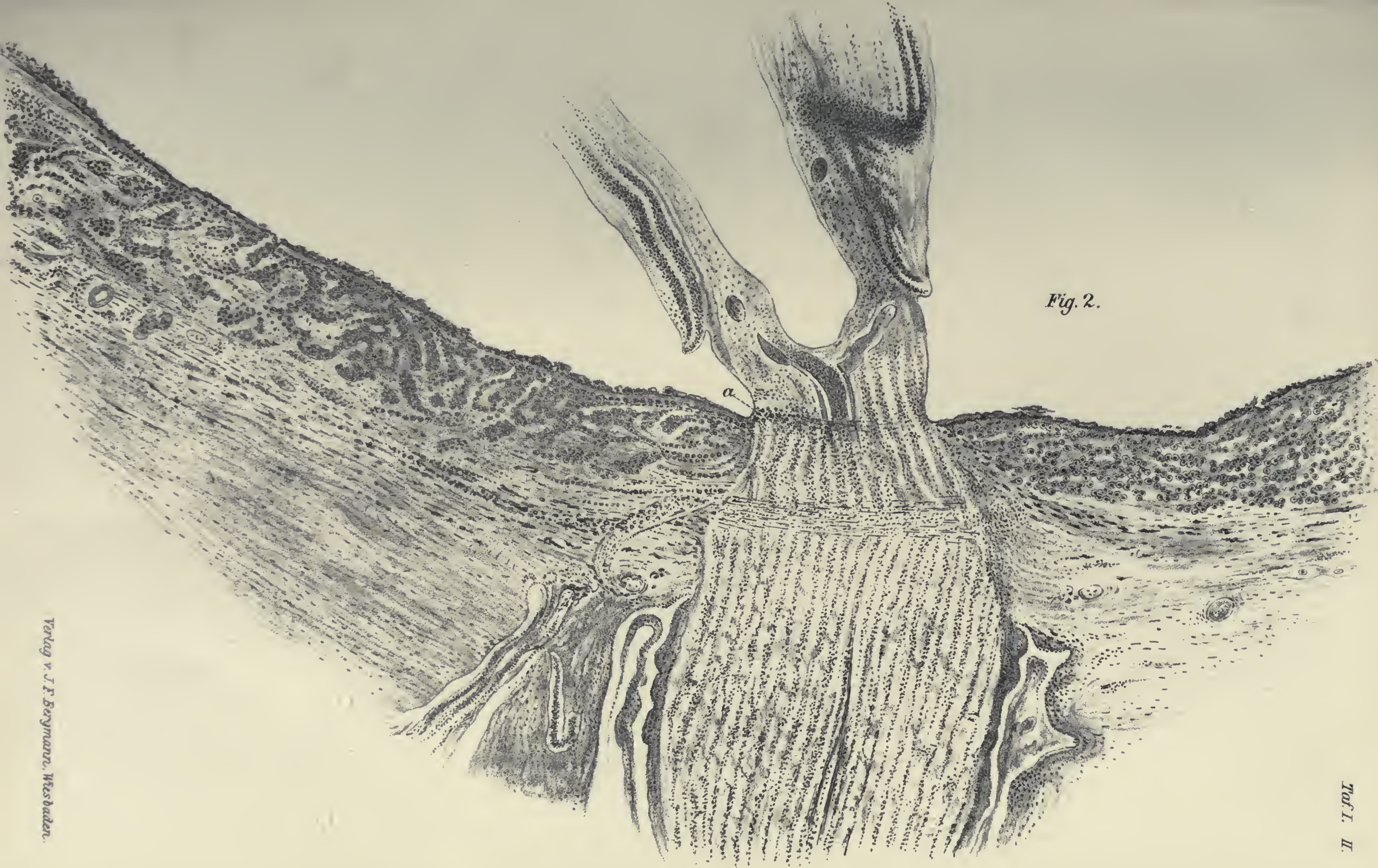

Fig. 2.

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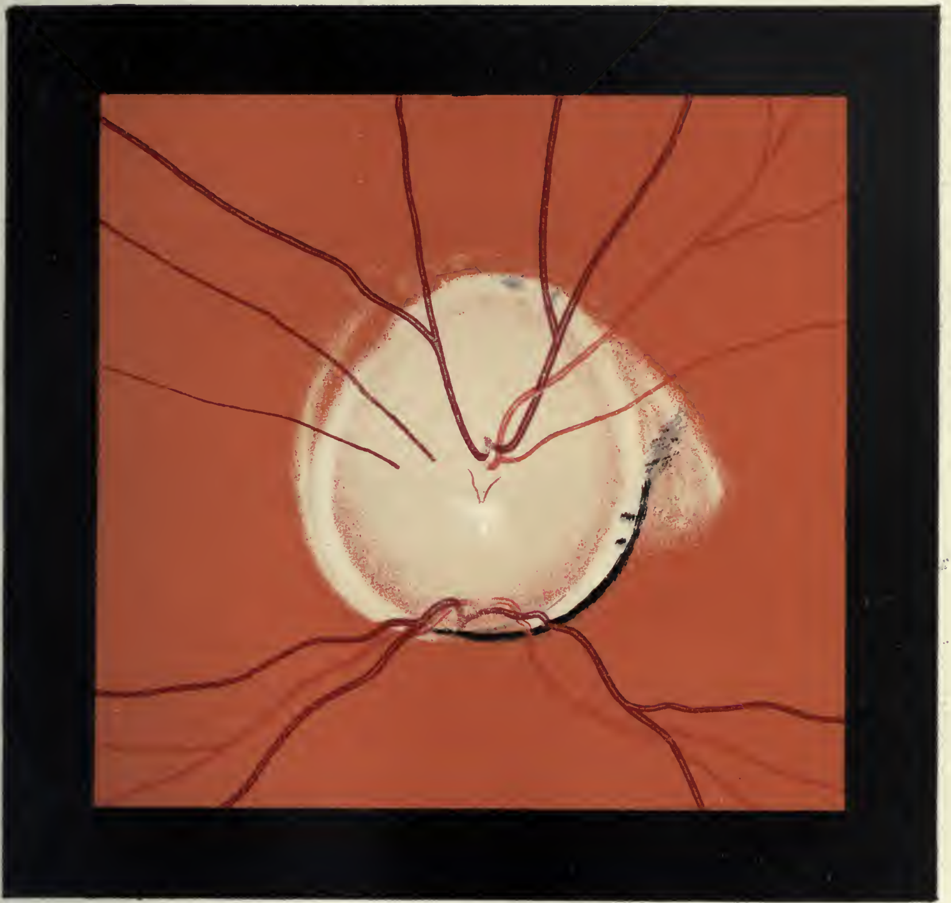
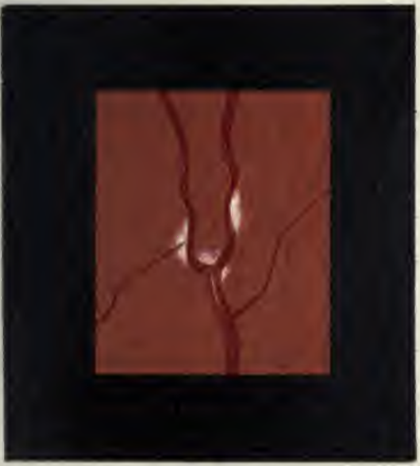
Fig. 2.



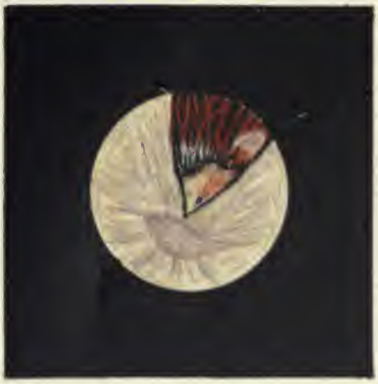
H. Laube.

Fig. 1.



Doppelt conturierte Nervenfasern
Lilly F. — 5 Jahre alt. Linkes Auge.

Fig. 3.



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ARCHIVES OF OPHTHALMOLOGY.

ISOLATED PARALYSES OF THE OCULAR MUSCLES.

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PARALYSES of the ocular muscles are of great interest not only to the professed ophthalmologist, but also to the neurologist and general practitioner. Indicative in many cases of grave disease of the central nervous system, such as cerebral syphilis or tuberculosis, tabes, etc., they are then of marked diagnostic and prognostic significance. In other cases, they may be of comparatively innocent nature and be dependent upon transitory causes; and in still other cases, as when congenital or produced by traumatism (*e. g.*, by tenotomy), they may be entirely devoid of any ulterior pathological significance.

That type of paralysis in which but a single one of the ocular muscles is affected is particularly interesting, because it affords some clew to the yet unsolved problem of the precise situation and inter-connection of the separate nerve-nuclei scattered beneath the aqueduct of Sylvius and along the floor of the fourth ventricle, and, furthermore, because such paralysis, except when affecting the external rectus and superior oblique, is supposed to be unusual. It is, however, certainly more frequent than has hitherto been believed.

The following cases are reported either as showing the comparative frequency of paralyses hitherto regarded as rare, or because they exhibit the presence of peculiar features in paralyses of the more common type and illustrate the course that the latter tend to pursue.

A few words in regard to the *diagnosis* of ocular paralyses in general may not be amiss. This diagnosis, as is well known, is based partly upon the characteristic restriction of the movements of the affected eye in some particular direction, partly upon the relation of the double images. In either case, it depends upon the fact that, in order to move the two eyes in any given direction, a special muscle or set of muscles is brought into play in each eye, which muscle or muscles[1] move their respective eyes at precisely the same rate, and which gradually cease to act as the eyes are carried in the reverse direction. Thus when we look up and to the right, our right eye is carried to the right by the external rectus, and up mainly by the superior rectus; and our left eye is carried to the right by the internal rectus, and up mainly by the inferior oblique. On the other hand, when we look up and to the left, our right eye is carried up mainly by the inferior oblique, and our left eye up mainly by the superior rectus. In both cases, the two eyes under normal conditions keep pace with each other very precisely, the superior rectus elevating one eye just as fast as the inferior oblique elevates the other, so that there is no deflection and hence no diplopia. If now, when the gaze is directed up and to the right, the right eye evidently lags below its fellow (and a diplopia indicating that the right eye is below begins to develop), the discrepancy must be due to an inequality in the muscles that elevate the two eyes, and in fact to a relative weakness of the right superior rectus. If the same discrepancy occurred when the eyes were directed up and to the left, it would indicate a relative weakness of the right inferior oblique. If again a discrepancy of the opposite sort (*i. e.*, a lagging of the left eye below the right) develops as the eyes are carried up, it means weakness of one of the left elevators, and in fact of the left superior rectus or the left inferior oblique, according as the discrepancy is most pronounced in the left-hand or in the right-hand upper field.

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[1] It is quite certain that for the production of even the simplest movements of the eye more than one muscle is necessary. Thus when the eye is moved straight outwards there is a contraction not only of the external rectus, but also of the superior and inferior recti and of the superior and inferior obliques. These muscles by their counter-traction tend to keep the eye steady in its path, and in the case of the obliques also reinforce the action of the external rectus (the more so, the more the eye is moved outwards). The proof of this is that if one of these auxiliary muscles (*e. g.*, the superior rectus) is paralyzed or acts spasmodically, it will cause even in the course of movements in a horizontal line a marked deflection up or down. For extended remarks upon this point, with tables and diagram showing the part taken by each muscle in the associated movements of the eyes, see the author's *Motor Anomalies of the Eyes*, J. H. Vail & Co., New York, 1897, pp. 9–19 and 26–29.

The discrepancy may be great or small. If small, it will produce a diplopia of small amount, and one which begins to develop only when the eyes have been carried nearly to the limits of their excursion and which increases slowly. Such diplopia may be physiological, being due to simple tiring of the eyes or to slight normal inequalities in the movements of the two. But a great discrepancy, producing a diplopia which begins to develop when the eyes are in the primary position or are removed not more than 25° from it, which increases rapidly, and which soon becomes absolutely great in amount, can only be due to pathological weakness or over-action of one or more of the ocular muscles.[1] And if the diplopia is very great and increases very rapidly, it must be held to indicate paresis (or spasm[2]), as no other conditions can produce such a very marked inequality in the movements of two organs which ordinarily keep pace with each other up to the farthest limits of their excursion.

While in all pronounced cases of ocular paralysis the lagging of the affected eye behind the other in the performance of associated movements is easy to recognize, the most satisfactory and certain evidence of the trouble is obtained from the *double images*. For determining these, the following method probably gives the most accurate results. The patient is placed (preferably in a dark room) with his head fixed and with his eyes in the primary position, *i. e.*, with both directed straight ahead and on a level, and a red glass is placed before one eye. A lighted candle, which, in order to avoid the disturbing effects of projection, should be not less than three or four feet from the patient, is carried successively to the right, left, up, down, and obliquely, and the patient is asked whether he sees two images of the flame, what is their color, how they are placed with regard to each other, how far they are apart, and whether the distance between them increases or diminishes as the candle is carried in each direction. If he sees one flame, and that particolored (yellow with a pinkish border), he has binocular single vision. If he sees one flame, which, however, is either pure red or pure yellow, he probably has double vision, but ignores one of the images (monocular vision). If he sees two flames, one red and the other yellow, he has diplopia, the nature of which is indicated by the relative position of the red and the yellow flames. Thus, when the red glass is placed before the right eye, the red flame may be:

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[1] A diplopia which occurs uniformly when the eyes have been carried not more than 40° from the primary position in any one direction cannot be regarded as physiological (*l. c.*, p. 35). See, for a more extended discussion of this subject, the author's article, "Diplopia in the Periphery of the Field of Fixation and its Bearing on the Diagnosis of Muscular Paralysis," in the ARCHIVES OF OPHTHALMOLOGY, xxiv., 4 (1895).

[2] Paresis and spasm are here taken in their widest sense, as meaning underaction and over-action due to anomalies of the muscles themselves as well as of their nerve supply. Paresis and spasm may be classed as structural, insertional, or innervational, according as the structure of the muscle, the insertion of its tendon, or the nerve and nerve-nucleus supplying the muscle are at fault; and it is to be noted that the symptoms presented by these three classes of anomalies are not *essentially* different.

To the right of the yellow flame (*Homonymous Diplopia*), indicating convergence of the visual axes.

To the left of the yellow flame (*Crossed Diplopia*), indicating divergence of the visual axes.

Above the yellow flame (*Left Diplopia*[1]), indicating vertical divergence of the visual axes, with the axis of the left eye higher (left hyperphoria).

Below the yellow flame (*Right Diplopia*[1]), indicating vertical divergence of the visual axes, with the axis of the right eye higher (right hyperphoria).

The distance between the double images may vary from four or five inches (representing an angular deviation of 5°, or the deviation produced by a 10° prism) to several feet.

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[1] The terms Right and Left Diplopia (DR and DL) were devised by the author ("Some New Tests for Insufficiences," *N. Y. Med. Journ.*, Aug. 3, 1889) to avoid the cumbrous periphrasis "vertical diplopia with the image of the right eye below" (or "above"). They correspond, as will be seen, to the conditions of right and left hyperphoria, and, like the latter terms, convey no implication (any more than do the terms homonymous and crossed diplopia) as to the *eye* which is at fault. *E. g.*, right diplopia, like right hyperphoria, may signify either that the right eye is too high or that the right eye is normally placed and that the left eye is too low; just as homonymous diplopia in itself simply means that one of the two eyes converges unduly, but does not show which one does so.

PARALYSIS OF THE EXTERNUS.

Case 1.—**Paresis of Left Externus Following Diphtheria.**

Boy, five or six years of age, seen in the Vanderbilt Clinic, March, 1895. Diphtheria five weeks before, with loss of reflexes, various pareses, and interference with phonation.

Movement of left eye outwards markedly restricted. No other impairment of movements of eyes. Left pupil reacts to light. Accommodation not tested.

Right eye, chalky cataract. No reaction of pupil, either direct or consensual.

Case 2.—**Paresis of Both Externi Following Diphtheria; Secondary Contraction of Interni.**

Maggie C., aged six. Seen at the Vanderbilt Clinic, March 28, 1895. Had diphtheria four years ago, followed apparently by various paralyses. Present condition of eyes developed soon after the attack.

For straightforward directions of the gaze, slight convergent strabismus; particularly noticeable on alternate covering (screen test). Behind the screen, left eye deviates inwards more markedly than does the right. Left eye moves outward scarcely at all beyond middle line; outward movement of right eye limited to one-half the normal. When eyes are directed up, the eye not used for fixation tends to deviate strongly inwards.

Post-diphtheritic paralysis of the exterior muscles of the eye is usually regarded as rather rare, the ordinary ocular lesion following diphtheria being a paralysis of accommodation without involvement either of the extra-ocular muscles or of the sphincter iridis. Uhthoff, Mendel, and Rosenmeyer, however, have observed four cases of paralysis of the externus with or without involvement of the other muscles and the accommodation, and Remak, out of one hundred cases of post-diphtheritic paralyses of the ocular muscles, found ten of unilateral or bilateral paresis of the externus. I myself have seen at least two other cases of the sort, and also one of paretic *outward* deviation following diphtheria.

It is to be noted that, in many instances at least, the paralysis of the exterior ocular muscles produced by diphtheria, instead of being temporary as is usually the case with such post-diphtheritic lesions, persists, and, as in Case 2, is followed by more or less contracture of the antagonists. The cause of the paralysis, according to Mauthner, is a lesion, probably consisting of capillary hemorrhages, of the nerve-nuclei. But why, if this explanation is the correct one, the external rectus should be so predominantly affected, and why, moreover, the muscles of both sides are so comparatively often involved, does not seem clear.

In paralysis of the externus, not only is there restriction of movements outward, but, in movements up and out and down and out, the vertical meridian of the cornea of the paretic eye undergoes less rotation than does that of the sound eye. This follows from the way in which the superior and inferior recti and obliques act upon the eye in the different oblique positions of the gaze. The result, theoretically at least, is that, when the eyes are directed obliquely up or obliquely down, the *double images are tilted* with regard to each other, and there is, moreover, a vertical as well as an homonymous diplopia. Such diplopia, however, requires very accurate observation on the part of the patient for its recognition, and hence is very rarely observed. In one case which I saw, and in which a vertical diplopia already existed, the diplopia increased and decreased exactly as it should do according to the theory; but in no other instance that I recollect have I been able to verify the existence of vertical diplopia of this sort, and in no instance at all have I been able to make out with certainty that there was any tilting of the double images.

PARALYSIS OF THE SUPERIOR OBLIQUE.

CASE 3.—**Bilateral Paralysis of the Superior Oblique.**

D. B., Italian, male, aged thirty-four, seen at Ophthalmic and Aural Institute, March 19, 1894. Severe attack of rheumatism, affecting arms, legs, and body generally, six months ago. Diplopia developed suddenly at that time and has persisted ever since. Present only when he looks down, and associated with vertigo; also with confusion when he goes down-stairs. No headache.

Homonymous diplopia in the whole lower field of fixation. When he looks downward in the middle line, images are on a level ; as he looks down and to the right, a marked vertical diplopia develops with the image of the left eye below, and as he looks downwards and to the left, a (somewhat less marked) vertical diplopia with the image of the right eye below. Tilting of the double images both in looking down and to the right and down and to the left, the image of the right eye being tipped to the left.

Subsequent examinations made in the course of the next two weeks gave precisely the same finding.

Bilateral paralysis of the superior oblique is certainly very rare. Mooren, in 108,416 cases of eye disease, had not seen a single case of the kind. Mauthner, whose acquaintance with the literature of the subject was doubtless great, appears to have heard of but one case (that of Remak, reported in 1887), and remarks that if such occurred both the objective signs and the subjective symptoms must be insignificant. That they are not so, is evident enough from the case cited above.

The symptoms, in fact, are as pronounced, and the diagnosis is as easy as in a case of unilateral paralysis. What the signs of such a condition must be, is evident from the following considerations.

A more or less equal paralysis of both superior obliques will produce a restriction in the movement of each eye downwards. When both eyes are directed *downwards and forwards*, this restriction will be equal for the two, so that the eyes, although neither moves perfectly downwards, will remain on the same level. Hence there will be no vertical diplopia in this position of the gaze. On the other hand, when the eyes are directed *down and to the right*, a position in which the depressing action of the left superior oblique comes very strongly into play, while that of the right superior oblique is little or nothing, the restriction in the downward movement of the right eye will be slight and decreasing and that of the left eye will be marked and increasing, so that the left eye will come to stand more and more above the right ; hence, as the gaze is carried in this direction, we shall find a vertical diplopia indicative of a progressively increasing left hyperphoria, *i. e.*, a vertical diplopia with the image of the left eye below that of the right (*left diplopia*) and falling more and more below, the farther the eyes are carried to the right. Similarly, when the eyes are carried *down and to the left*, we shall find a progressively increasing vertical diplopia with the image of the right eye going below (*i. e.*, a rapidly increasing *right diplopia*). Again, *for all downward directions* of the gaze there will be *homonymous diplopia*, because, owing to the abolition of the abducent action of its superior oblique, each eye tends to converge abnormally. This homonymous diplopia, which is marked in paralysis of one superior oblique, will be still more so in bilateral paralysis. The same is true of the tilting of the double images, which will be more pronounced in bilateral than in unilateral paralysis, since, owing to the abolition of the inward rotating action of both superior obliques, the vertical meridian of both eyes will tend to diverge. This divergence of the meridians produces convergent tipping of the double images (*convergent rotation diplopia*). In paralysis of the right superior oblique, this tilting of the images will be most pronounced when the patient looks down and to the right; in paralysis of the left superior oblique, most pronounced when he looks down and to the left. In bilateral paralysis, it will be marked and equally so in both positions, of the gaze. Lastly, in the upper half of the field of fixation, in which the superior obliques normally exert no action, there will be no deviation and no diplopia.

Hence, if in a simultaneous paralysis of both superior obliques a red glass is placed before the right eye, there will be single vision above the horizontal plane, and double vision everywhere below, with the red image on the right of the white and with the red image tilted to the left. When the eyes are directed downwards and forwards, the red and white images are on a level; as the eyes are directed down and to the right, the white image falls rapidly below the red; and as the eyes are directed down and to the left, the red image falls rapidly below the white.

These are the typical features of a simultaneous paralysis of both superior obliques, and, as will be seen, these were precisely the features met with in the case detailed above. Moreover, no other pathological condition produces just these symptoms.[1] Hence there is no doubt of the diagnosis in this case, particularly as the findings were substantiated by repeated examinations made at different times.

The following case shows how the subsequent course of a paralysis of the superior oblique is complicated by the development of secondary contractures and by spasmodic action of the opponents of the paralyzed muscle.

CASE 4.—**Paralysis of Left Superior Oblique with Consecutive Spasm of Left Inferior Oblique; Central Choroiditis.**

Jane W., aged sixty-five, came to my office, Aug. 20, 1895. Sight poor for last three or four years. For four or five years confusion of sight, particularly marked if she goes down-stairs, when she has to shut her right eye to avoid making a misstep. Cannot tell when she gets to the last step. No vertigo, diplopia, nor headache.

R: $\frac{20}{70}$ —; + 1.00 cyl. ax. 10° t., $\frac{20}{50}$ +. L: $\frac{20}{70}$ —; — 0.50 + 1.00 cyl. ax. 20° t., $\frac{20}{40}$ —. Peripheral field normal. Media clear. In region of yellow spot, faint light patches of irregular shape, lying beneath retinal vessels.

In primary position, left hyperphoria and vertical (left) diplopia of many degrees. Behind screen, left eye stands markedly higher. In performing downward movements, the left eye lags markedly behind the right, and this restriction of movement is more pronounced when the eyes are carried down and to the right than when they are carried down and to the left. The vertical (left) diplopia also increases greatly as the eyes are directed down and very greatly when they are directed down and to the right. (In the latter position the vertical distance between the two images of a candle held three and a half feet from the patient was a foot and a half.) As the eyes are carried up, the vertical diplopia diminishes, and when the gaze is directed up and to the left disappears altogether; vertical (left) diplopia, on the contrary, marked when the gaze is directed up and to the right. No tilting of the double images.[1]

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[1] Paralysis of the left superior oblique with spasm of the left inferior rectus would, it is true, produce nearly the same symptoms. But in the cases that I have seen in which there was evident spasm, the deviation and diplopia from the nature of things did not remain constant, but showed abrupt and irregular changes in character and amount from one time of examination to the other. In the case under consideration, the constancy of the conditions and the absence of any evidences of spasmodic, excessive movement precluded the idea of a spastic deviation.

September 4th.—Conditions same, except that vertical (left) diplopia is also marked for directions of the gaze down and to the left and up and to the left. When the eyes are carried up and to the right, the right eye seems to lag below. When the eyes are carried to the right on a horizontal line, *left eye flies obliquely up.*

Here the original condition was doubtless a paralysis of the left superior oblique. This would have produced a vertical (left) diplopia, present only in the lower field and increasing markedly as the eyes were carried down and to the right. Later, contracture of the left elevator muscles (particularly the left inferior oblique) set in, producing elevation of the left eye above the right and a vertical (left) diplopia extending to the upper and especially to the right and upper portions of the field of fixation. At times also the effects of this steady contracture, which by itself would produce a more or less constant diplopia, were exaggerated by the development of an irregular spasmodic contraction of the same muscles, the net result of which was to transform into an almost concomitant deviation one which was at first markedly non-concomitant. This sort of transformation I have repeatedly observed, and in another place have commented upon it at length.[2]

It is to be noted that in the case described the evidences of *spasm of the inferior oblique* were particularly marked. No other condition could have produced the pronounced upward movement of the left eye, developing when the attempt was made to carry the eye inward along a horizontal line and increasing in proportion as the eye was carried to the right.

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[1] It may be pointed out how much more clearly and concisely these conditions are set forth by the use of the abbreviations and symbols recommended by the author (*N. Y. Medical Journ.*, Aug. 3, 1889 ; ARCH. OF OPHTH., April, 1894). The above record for August 20th would then read as follows :

DL many degrees. L H (Phorometer, many degrees ; Screen, marked). Ed, L. eye lags very greatly (in Ed. and r > Ed and l). Ed, D L > > and in Ed and r > > > (at 3½ ft. = 1½ ft. vertical distance). In Eu, D L < <, but in Eu and r still marked. Eu and l, DX. No tilting of double images.

[2] *Motor Anomalies of the Eye*, pp. 48, 53, 54, 57.

PARALYSIS OF THE SUPERIOR RECTUS.

In the ARCHIVES OF OPHTHALMOLOGY for April, 1894, I reported a number of cases of paresis, simple or complicated, of the superior rectus. Some of these cases I had the opportunity of re-examining later, and out of ten in which the data were sufficient to leave no doubt as to the conditions present, the original diagnosis was confirmed in eight (ARCHIVES OF OPHTH., xxiv., 4, 1895). Subsequently Bernstein reported three cases before the American Medical Association (See *Journ. Amer. Med. Assoc.*, Nov. 9, 1895); and I myself have seen no less than fourteen others in which the evidences of a complete or well-marked paralysis were indubitably present. The following will serve as an example of the cases in which the paralysis was incomplete.

CASE 5.—**Paresis of Right Superior Rectus; Insufficiency of the Interni.**

Miss J. D., aged about twenty-five, came to my office, January 15, 1896. Sight has always been poor, and for about one year right eye has tended to diverge.

R: $\frac{10}{200}$; − 4.00 $\frac{20}{70}$ +. L: $\frac{20}{100}$; − 2.00 − 2.00 cyl. ax. 75° n, $\frac{20}{40}$. Interior normal.

In primary position, fixes more readily with right than with left eye for ordinary distances, but at very near points fixes with left eye, and right diverges. At her reading distance (5″), alternate monocular fixation. Sometimes when she fixes with right eye, left flies far up (secondary contraction).

In primary position, crossed and slight vertical (left) diplopia; and by screen-test, divergence both for distance and near and left hyperphoria. Inward movements of both eyes limited, outward movements excessive. When she looks up, the right eye lags below, this vertical deviation increasing greatly when she looks up and to the right, while when she looks up and to the left only a lateral deflection (divergence) can be made out. The vertical (left) diplopia, too, increases greatly as the gaze is directed up and to the right (several examinations); elsewhere diminishing or absent. Frequently loses one of the double images, especially that of the left eye.

Here we have an almost typical picture of paralysis of the right superior rectus. The features that we should expect to find in such a case are as follows: Below the horizontal plane, single vision and absence of deflection; at and above it, lagging of the right eye below the left, and divergence (due to the abolition of the adducent action of the superior rectus). This deflection, both vertical and divergent, and hence also the diplopia (crossed and vertical) will increase as the eyes are carried up. The vertical deflection and diplopia (left diplopia) increases rapidly as the eyes are carried up and to the right (a position in which elevation of the right eye is performed mainly by its superior rectus), and diminishes to zero as the eyes are carried up and to the left (a position in which elevation of the right eye is performed mainly by the inferior oblique). On the other hand, the lateral deviation (and the crossed diplopia) will be little or nothing in the up-and-right position of the gaze (where the right superior rectus exerts no lateral action), and will be most marked when the eyes are directed up and to the left, a position in which the chief action of the right superior rectus is to adduct the eye, and in which, therefore, paralysis of the muscle will produce the greatest effects in causing a lateral deflection.

These features were pronounced in the case above recorded.

One peculiar feature of this and of some other cases of paresis is the tendency displayed to *perform fixation with the paretic eye*, which in this case, moreover, was the more amblyopic of the two. The explanation for this phenomenon may be that when the paretic eye fixes, there is, as is well known (and as was well seen in the present case), a marked secondary deviation of the unaffected eye, the deflection being therefore greater when the paretic eye fixes than when the sound eye fixes. Now it frequently happens that when an insuperable deviation exists, it is the less troublesome to the patient the greater it is; for, the wider apart the double images are, the more readily can the false image be ignored. Hence, it is rather an advantage for the patient to fix with his paretic eye, unless the paresis is so great as to require him to make an excessive effort in order to do so.

The *tilting of the double images*, that should theoretically exist in all cases, was not noticed in this. Although

Mauthner says that practically it does not occur at all, it was present in five of the cases that I previously reported and in two of those that I have examined since (including one of total, congenital paralysis).

The *insufficiency of adduction* here observed, is a common feature of these cases. In my former paper I had already noted the presence of an exophoria, which is usually unassociated with an increase of abducting power and which itself tends to gradually increase. This exophoria, in fact, seems to be the cause of most of the symptoms, and occurs so frequently as to leave no doubt that the paralysis of the superior rectus stands in causal relation to it. Such a paralysis necessarily entails a slight restriction of the inward movements of the eye, a restriction particularly marked when the eye is near the limits of its inward excursion, and leads, as I have had occasion in several cases to observe, to a progressive limitation of convergence quite out of proportion to the limitation in lateral movements; *i. e.*, produces a true *convergence-insufficiency*[1] in addition to the original insufficiency of associated adduction. The moderate divergence thus set up may, as I have also had occasion to observe, increase until an actual strabismus divergens is developed.

The *frequency* of these cases of paralysis of the superior rectus is quite surprising. *A priori*, there seems no reason why one of the four muscles supplied by the third nerve should be paralyzed oftener than another. Yet the extreme rarity of paralysis of the inferior oblique has long been recognized, and the comparative frequency of paralysis of the superior rectus can, it seems to me, scarcely be gainsaid. Thus I have seen twenty-two well marked cases. To be sure, five of these were traumatic, *i. e.*, produced by complete tenotomy of the superior rectus, and these cases should properly be excluded in estimating the real frequency of the affection. Of the remaining cases I am inclined to think that the majority are attributable to intra-orbital causes (non-development or faulty insertion of the muscle itself) rather than to a lesion of the nucleus. Many of the congenital cases, certainly, are due to non-development of the superior rectus (Mauthner, Fuchs); and it is likely that most of the cases observed in the young, and which show no tendency to change from one time to another, are really congenital. Such cases are comparatively frequent. And of the cases seen in older persons, few present either the causes or the symptoms usually ascribed to nuclear paralyses.

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[1] *I. e.*, a condition associated with slight exophoria for distance, no special increase in the diverging power (power of overcoming prisms base in), marked exophoria for near, recession of the convergence near-point (to five or more inches), and real limitation of the prism-convergence (power of overcoming prisms base out).

If the paralysis is regarded as nuclear, it would indicate that the nucleus of the superior rectus is somewhat remote from the other partial nuclei constituting the oculomotor group.

According to most observers, paralysis of the superior rectus occurs much *less frequently* than I have found. Thus in 188,000 ophthalmic cases of all sorts recorded by four different authors, this condition was observed in but 20 (Mauthner). But this matter of statistics is one into which the personal equation enters very largely, and, as the condition under consideration is not one that is obvious at first glance, but is revealed only by careful examination, it is natural that a man who directs his attention to the study of muscular anomalies should see more cases relatively than another does whose attention is otherwise engaged. This fact is strikingly brought out by an analysis of the above statistics. Mooren, who records 108,000 cases of eye-disease, did not observe a single instance of paralysis of the superior rectus, while A. Graefe with 40,000 cases saw 9, and another observer with 20,000 cases saw 8 of this anomaly. The reason for this discrepancy lies, perhaps, partly in a real difference in the cases, but mainly, no doubt, in the fact that some of the observers examine less thoroughly than others for muscular anomalies and hence overlook the less obvious ones. In support of this view it is to be noted that this condition is not often associated with any very marked symptoms which call attention to its presence. It causes, for example, nothing like the characteristic disturbances that paralysis of a depressor muscle (either superior oblique or inferior rectus) occasions. For, while in the ordinary affairs of life we often have to look down, we rarely need to look up, and hence a diplopia which occurs only when we look up may readily be disregarded or even overlooked altogether. Accordingly, many of the patients make little complaint, do not allege the existence of diplopia, and come in most cases for the correction of some trouble quite independent of their muscular anomaly. The surgeon corrects the trouble that the patient comes for, without usually making any very searching ulterior examination, and naturally overlooks that to which his attention has in no way been called.

That this is the true explanation of the discrepancies above noted I am persuaded from seeing how readily the condition might, even when well marked, have been overlooked in the cases that I myself observed, had not the muscles been examined as a matter of routine in all.

PARALYSIS OF THE INFERIOR RECTUS.

Paralysis of the inferior rectus causes the patient much more disturbance than does that of the superior rectus. It occasions, in fact, much the same symptoms as paralysis of the superior oblique, namely, diplopia, false projection, and vertigo, increasing rapidly as the eyes are directed downwards. Reading, writing, walking, and going down-stairs[1] cause pain, a sense of uncertainty and confusion, and vertigo; and even in the very slight cases I have noticed that pain and vertigo were produced when the patient tried to look far down. On account of this marked character of the symptoms, this form of paralysis is probably much less often overlooked than is paralysis of the superior rectus, and hence its relative frequency has very likely been exaggerated. In the series of 188,000 cases already mentioned, it is noted as occurring in 26 (a proportion of 1:7,000), while if we take the statistics of A. Graefe, which are much more likely to be accurate on this point, we find a proportion of 10 out of 40,000 or 1:4000. Schubert and Schöler's figures taken together give the same proportion. Graefe,

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[1] Theoretically at least. Nevertheless, those patients whom I have questioned did not seem to have much trouble in going down-stairs, and the most disturbing symptoms seemed to be the blurring of sight, confusion, and asthenopia dolens produced by the use of the eyes for reading, writing, and drawing.

Schubert, and Schöler found almost precisely the same number of cases of paralysis of the superior and of the inferior rectus, but from the considerations already advanced it would seem that this apparent equality is not real. In my own experience, I have observed 11 cases of paralysis of the inferior rectus, 3 of which, however, were of comparatively slight intensity, while one of the others was traumatic in origin. So that, as against 17 well-marked cases of non-traumatic paralysis of the superior rectus there were but 7 in which the inferior rectus was involved to a like extent.

The following case, which I have already elsewhere reported,[1] illustrates the chief features of such a paralysis, and also the development of secondary spasm in a case of long standing.

Paresis of Right Inferior Rectus. Varying Spasm of Right Superior Rectus.

H., male, aged twenty-nine, came to the Ophthalmic and Aural Institute, February 10, 1896. For two years vertigo and blurring of sight for near, especially for his work (fine mechanical drawing). Diplopia spontaneous, but superable. No trouble in going down-stairs.

R $\frac{20}{70}$ +; − 0.50 − 0.50 cyl. ax. vert. $\frac{20}{30}$ −. L $\frac{20}{200}$; + 2.00 cyl. ax. 10° n. $\frac{20}{70}$+. Fixes mainly with right eye.

Behind the screen, both for distance and near, the covered eye diverges for all directions of the gaze. When the eyes are directed straight ahead, the right eye moves up and the left eye moves down, when screened. This vertical movement becomes marked when the eyes are directed down, and extremely marked when they are directed down and to the right, but is little marked or absent when the eyes are directed down and to the left or are directed up.

With a test-object held at 3 feet, moderate crossed and right diplopia (vertical diplopia with the image of the right eye below). Right diplopia increasing as the eyes are carried down, and markedly so as the eyes are carried down and to the right (here = 6° deviation = diplopia produced by a 12° prism). Right diplopia diminishing to zero, and crossed diplopia increasing when the eyes are directed down and to the left. Right diplopia also diminishing to zero when the eyes are carried far up.

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[1] *Motor Anomalies of the Eye*, p. 53.

Feb. 19th.—Vertigo more marked. Sense of strain in the eyes when he tries to move them. Is conscious that the right eye does not move downward as it should. Vertical (right) diplopia greater and now present more or less in all parts of the field of fixation, although still very much the most pronounced when the eyes are directed down and to the right (here now = 11° deviation = diplopia produced by a prism of 20°). Quite marked when he looks up and to the right, but here varying in amount. No tilting of the double images. Convergence near-point 5″, but sometimes not nearer than 7″ or 8″.

March 13th.—Findings essentially the same, except that there is now no vertical diplopia when the gaze is directed up in the middle line or up and to the left. Vertical (right) diplopia still when he looks up and to the right.

The patient at the date of the first observation showed a typical picture of paralysis of the right inferior rectus with evidently some contracture of the elevators (shown by the fact that the vertical diplopia still persisted even when the gaze was directed quite high up).

At the second visit it was evident that superadded to the original condition there was a more or less pronounced spastic contraction of the right elevators, particularly the superior rectus, causing a marked elevation of the right eye for all upward directions of the gaze, but most marked when the eyes were directed up and to the right. The variable character of this superadded deviation, and the fact that it had more or less passed off at the time of the third visit, showed that it was due to spasm and not to paralysis.

In this case, as in Case 5, *fixation was performed habitually by the paretic eye.*

The tendency to *divergence* and to the secondary development of a convergence-insufficiency, so marked in cases of paralysis of the superior rectus, was present also and doubtless for the same reason in this case and in some others of paralysis of the inferior rectus which I saw. But, owing to the natural tendency of the eyes to converge when directed down, this pathological divergence is much less marked than it is in paralysis of the superior rectus, and, in fact, is in some cases replaced by an esophoria, so that with the characteristic vertical diplopia we find homonymous instead of crossed double images. This, however, need cause no confusion in the diagnosis, since the latter can be made from the vertical diplopia alone. *E. g.*, a pronounced right diplopia (vertical diplopia with the image formed by the right eye below), which is present only in the lower field and which increases markedly as the eyes are directed down and to the right, and diminishes to zero as the eyes are directed down and to the left, can mean nothing else than paralysis of the right inferior rectus; and whether the image of the right eye is on the left or the right of the other image is not of material importance for the determination of the question.

SCOPOLAMINE HYDROBROMATE AS A CYCLOPLEGIC.

By T. E. MURRELL, M.D., Denver, Col.

I BEGAN the use of this agent for determining refraction two years ago, and I have used it exclusively since. Owing to ill-health and interrupted practice I have not had the opportunity to use it on so large a scale as I could otherwise have done, but I have records of fully two hundred cases in which I have determined the refraction under scopolamine.

I made my first report on its effects in the *Annals of Ophthalmology and Otology*, vol. iv., No. 4, October, 1895. At that time I had used it in fifty-seven cases. To this number I can now add about one hundred and fifty more cases.

Strength of Solution.—Scopolamine is about ten times as powerful and ten times as toxic as atropine. Its systemic effects in poisonous doses are similar to those of atropine with a greater tendency to wild and boisterous delirium. Dr. Hobbs of Atlanta, to whose experiments with this drug we owe much of our knowledge, was thrown into furious delirium by one-half of one per cent. solution, one drop in each eye. He cautions particularly against the use of strong solutions. There have been published within the last year several reports of systemic poisoning by the instillation of a solution of scopolamine in the eyes, and in every instance it was used to excess. In one case a lady was given a *one-per-cent. solution*, and told to drop one or two drops in each eye three times daily. The result was, the first drops poisoned her frightfully. In another case reported, a half of one per cent. solution was used repeatedly with poisonous effects. In a third report one-fourth of one per cent. solution was dropped, one drop at a time, in each eye every few minutes until instilled eight or ten times. Of course poisoning occurred. The one-tenth of one per cent. solution is fully as strong in its mydriatic and cycloplegic effects as a one-per-cent. solution of atropine, and far more positive than a single instillation of atropine. I have never used a stronger solution than one-tenth of one per cent., of which I habitually instil two small drops, about one minim, in each eye about ten minutes apart. At the end of one hour from the first instillation I have found the eyes ready for the refraction test. It is probable a single drop in place of two would answer every purpose, since it is the most positive and the speediest cycloplegic within my knowledge. Dr. Hobbs claims equally positive results with one-twentieth of one per cent. solution. For dilating the pupil, therefore, as in iritis, or for paralyzing the accommodation, there is no necessity for using a stronger solution than the one-tenth per cent., which is void of toxicity unless too frequently and too freely used and allowed to flow into the nasal duct, which is altogether unnecessary and avoidable. It should be dropped in a single drop from a small-tipped pipette on the upper margin of the cornea, while the upper lid is retracted, and allowed to flow over the cornea. We thus get all the eye will take up without an excess to flow into the lachrymal passages. A second or third instillation ten minutes apart causes no constitutional symptoms whatever, but applied ten or twelve times without regard to entering the punctum even the one-tenth per cent. solution will cause toxic symptoms. There is no necessity, however, for more than one repetition of the drop at a short interval to produce the most powerful mydriatic and cycloplegic effect.

Action.—The absorption and effect of scopolamine on the iris and ciliary muscle are very speedy. In ten minutes the pupil begins to dilate, and almost at the same time the accommodation is affected. In fifteen minutes the pupil is widely dilated and the patient is unable to read small print. Paralysis of the accommodation comes on rapidly, and it is totally suspended inside of an hour, often in thirty minutes, but my rule is to allow a full hour from the first instillation to time of beginning the refraction test to be sure of total suspension of the accommodation. The total suspension of accommodation lasts some hours. I have tested the refraction twelve hours after the instillation with perfect satisfaction, though I have found evidence in some cases of a slight accommodation after six hours. In twenty-four hours the cycloplegia begins to decline, and at the end of forty-eight hours has wellnigh passed away, while in seventy-two hours it has generally totally disappeared. The mydriasis usually persists slightly longer. In point of time of inception and termination of cycloplegia, scopolamine in the one-tenth per cent. solution is the most uniform of any agent I have ever used. Prior to using it I relied on homatropine for determining refraction, but met with occasional instances in which it failed after numerous and long-continued instillations of a two-per-cent. solution to totally suspend the accommodation. In about two hundred successive cases scopolamine has not once failed me.

Advantages. — Atropine is objectionable for refraction work, because of the time required to fully suspend the accommodation, and because of the long persistence of its effect on the pupil and ciliary muscle. Furthermore, when the age of presbyopia is approaching, it is not altogether free from the danger of exciting a tendency to glaucoma. The fault with homatropine is threefold: 1st. It is not absolutely positive in its cycloplegic effects, and may lead to erroneous results. 2d. It often very greatly congests the eye, followed, in some instances, by a dull, heavy aching that persists several hours. 3d. It demands a great deal of time and attention on the part of the surgeon in using, one surgeon (Savage) instilling a drop every ten minutes for an hour, another (Reynolds) every minute for ten minutes, others a drop every five minutes five or six times.

Scopolamine requires only the second instillation after ten or fifteen minutes, and if the surgeon should be busy and not get ready for the examination for two or three or even six hours, he will find the eyes in the right condition; whereas with homatropine the examination must be made promptly within a short time after its full effects. From scopolamine in the strength herein recommended there is no increase of tension, no reddening of the eye, but rather a blanching than otherwise, the sclera appearing unusually white; nor is there the slighest sense of discomfort of any sort further than that produced by the annoyance of excess of light and confusion of vision. A weak solution of eserine, one-fourth grain to the ounce, used a few times at intervals of six hours will effectually restore the accommodation. I used scopolamine on two busy physicians last summer, and by the use of eserine afterwards they had no trouble in reading, writing prescriptions, and attending to their practice.

The Solution.—My solutions have been put up with boric acid, ten grains to the ounce, but a simple solution might answer as well. Evidently scopolamine is germicidal, or fungicidal, since no spores or evidences of deterioration have ever appeared in any solution after a year or more. Nor does it seem in the least to lose its properties however long kept, the last of a solution more than a year old being as potent as when first prepared.

Summary.—1st. Scopolamine hydrobromate is the most positive and prompt cycloplegic we have.

2d. It should not be used in a stronger solution than the one-tenth of one per cent.

3d. Two instillations at most are all-sufficient for the most thorough suspension of the accommodation.

4th. It is free, in this strength, from the danger of increased tension, and causes no redness of the conjunctiva nor engorgement of the choroid, and no unpleasant symptoms other than those due to its physiological action.

5th. It is convenient to use, reliable in its results, safe, keeps well, and possesses fewer objections than any other known cycloplegic.

After twenty years' experience in the use of agents to control the accommodation for determining errors of refraction, two years' use of scopolamine hydrobromate in some two hundred cases has satisfied me, personally, that it is the best agent for this purpose that has thus far been given us by materia medica.

Just as I am finishing this paper a young lady comes in to be refracted. One drop of one-tenth per cent. solution of scopolamine hydrobromate was instilled into each eye. In ten minutes, pupils were dilating. In fifteen minutes, they were widely dilated, and she could not read Sn. 2. D. Another drop was now put in each eye. In thirty minutes I began testing the right eye. In five more minutes I had the following formula: $+ 1.\ \mathrm{S} \frown\!\!\!\!\smile - 3.50\ \mathrm{C}\ 175^\circ$ $\mathrm{V} = \frac{15}{20}$. The left eye was then tested, with this result: $+ 2.\ \mathrm{S} \frown\!\!\!\!\smile - 4.\ \mathrm{C}\ 10^\circ$ $\mathrm{V} = \frac{15}{20}$. At the end of an hour the test was repeated on both eyes, and no modification of the above glasses improved vision.

AN OPERATION FOR TRICHIASIS DUE TO CICATRICIAL ENTROPION.[1]

By W. ODILLO MAHER, M.D.,

HONORARY OPHTHALMIC SURGEON TO THE SYDNEY HOSPITAL AND ST. VINCENT'S HOSPITAL, SYDNEY, N.S.WALES.

AN operation I have found give the most satisfactory results in cases of trichiasis and districhiasis, due to cicatricial entropion, consists in thoroughly dividing the tarsal cartilage from the under surface of the lid from end to end at about two and a half millimetres from its free edge, as in a Burow, and fixing with sutures between the edges of the divided cartilage a piece of mucous membrane the length of the tarsal cartilage and about two or three millimetres broad.

I perform the operation in the following manner:

Standing behind the patient, who is anæsthetized, I evert the lid, and make a puncture with a Beers knife through the tarsal cartilage, at the outer canthus if operating on the right lid, and at the inner canthus if operating on the left, and divide the cartilage and all structures of the lid to the skin from end to end, parallel with and about two and a half millimetres from its free edge, with a straight, blunt-pointed scissors, by passing one blade through the puncture, and subcutaneously along the length of the cartilage. The lower lip is now clamped with a Snellen entropion clamp to prevent hemorrhage, and a flap of mucous membrane the length of the incision in the cartilage, and from two to three millimetres broad, is marked out by two parallel cuts with a Beers knife, and removed by a few snips of a scissors. The mucous-membrane flap is then laid on the tip of the forefinger of the left hand, and any submucous tissue snipped off with scissors. Three silk sutures, two single and one double, with knots about two centimetres from the ends, are used. The single sutures are passed through the ends of the flap from its mucous surface, and then through the ends of the cut in the cartilage, coming out on the cutaneous surface of the lid near the canthi and a few millimetres from its free edge. The double suture is now passed through the middle of the flap from its mucous surface and through the middle of the cut in the cartilage, coming out on the cutaneous surface of the lid midway between the canthi and a few millimetres from its free edge. By drawing on these sutures, the knots pull the flap of mucous membrane well in between the cut edges of the cartilage. An assistant now applies with his finger a little traction on the skin of the lid, so as to cause the edge of the lid to evert and the wound in the cartilage to gape. The sutures are then tied. Either the two single or end sutures are tied together across the lid parallel with its free edge, and between the two threads of the double suture, which are tied over them, or the single end sutures may each be tied to a thread of the double central suture. I consider the latter the better way of tying the sutures, as the former sometimes causes the middle edge of the lid to evert a little too much. The edges of the wound in the lip, which causes very little inconvenience, are brought together with sutures, and it heals by first intention. The eyelids are dressed with an antiseptic dressing smeared with iodoform ointment, and left undisturbed for

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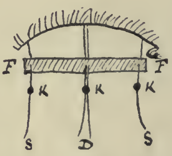
[1] A paper read before a meeting of the N. S. Wales branch of the British Medical Association, at which cases were shown.



F. F. Flap of mucous membrane.
K. K. K. Knots in the sutures.
S. S. Single sutures.
D. Double suture.

thirty-six hours, when the sutures are removed. The object of having the knots a couple of centimetres from the ends of the sutures is to facilitate their removal. The eyes are kept bandaged for a few days, so as to prevent any disturbance of the flap, *which takes readily.*

This operation was first performed by me in April, 1896, and during the following twelve months I operated on sixty-one cases. In two cases only the operation was a partial failure, as a few hairs on the outer canthi were touching the globe some weeks after the operation. The cause of these two partial failures was that the cartilage had not been divided up to the outer canthus. All the others were highly satisfactory, and some I have seen nine months after the operation. A special feature about this operation is that no tissue is removed from the lid, but tissue added to replace cartilaginous tissue at that part where it has undergone absorption. It produces no disfigurement, and the results are most satisfactory. The effect of the operation can be enhanced by a subcutaneous division of the outer canthus.

PRIMARY MELANOTIC SARCOMA OF THE LACHRYMAL CARUNCLE.

By SIMEON SNELL, F.R.C.S.Ed.,

OPHTHALMIC SURGEON TO THE SHEFFIELD ROYAL INFIRMARY.

IN the last number of these ARCHIVES (page 204) Dr. Veasey records a case of primary sarcoma of the caruncle, and mentions the few similar instances which have been published. Many years ago a case of melanotic sarcoma of the caruncle was under my observation, and it has not been placed on record. I take this opportunity of forwarding it for publication.

Mrs. B., aged sixty-two, was admitted under my care in the Infirmary on July 20, 1877. In the right eye was a tumor, involving and apparently springing from the caruncle and the plica semilunaris. It was about the size of a walnut and took very much the form of the caruncle and the plica. Its outer edge was well defined and overlapped half the cornea. There was no interference with the movements of the globe. Vision also was good when the eye was turned away from the tumor. The growth occupied half the palpebral fissure, protruding some little distance between the lids. It was of a dark sepia color and bled readily on being touched.

The patient stated that her son, nine months previously, had first called her attention to a black pimple in the inner corner of her eye. This had gradually increased in size, but its progress had of late been more rapid. The pain did not appear to have been very severe. Throughout life she had known little of sickness, and her general health did not now seem affected.

On July 25, 1877, the tumor was removed. The patient declined an anæsthetic. A tenaculum was passed through the growth, and with it the tumor was drawn forwards and carefully dissected out. It was found to reach between the inner margin of the orbit and the globe. It was, however, fairly easily removed entire. A portion of the upper lid close to the papilla lachrymalis and to which the growth was firmly adherent was also excised. The conjunctival wound was closed with sutures. Recovery was rapid.

For some months the patient remained free from any return of the disease. Then a suspicious dot or two appeared, and on my seeing her for the last time in the course of the summer of 1878, the size of the recurrent growth was considerably larger than that of the one removed. She died, I was informed, in September, 1878, but no further particulars were obtained.

The note made at the time states that microscopic examination of the tumor showed it to be a melanotic sarcoma; pigmented spindle and round cells, the latter predominating, were noticeable; there was also free pigment.

SYPHILITIC NEURO-RETINITIS.[1]

By LYMAN WARE, M.D., Chicago.

MR. PRESIDENT AND GENTLEMEN,—Not to occupy too much of your time, yet desiring to call your special attention to some unfortunate phases of this truly melancholy disease, we will consider principally its clinical aspect. I say "unfortunate phases" because, not to prevent so terrible a disease, when possible, is doubly sad and unfortunate. It may be said that not all cases of neuro-retinitis are *syphilitic;* yet, according to my own observation and that of others of greater and wider experience, at least 70 per cent. are.

In the prevention of a disease it is not always necessary to go back to childhood or the great-grandparents, however desirable that might be.

In my own experience, extending over many years, I do not recall a single case of syphilitic neuro-retinitis following thorough and prolonged anti-syphilitic treatment. By thorough and prolonged anti-syphilitic treatment I mean mercury given more or less continuously for two or three years, then irregularly or intermittently for ten or twelve years more. Mercury I believe to be curative, while the iodide of potash, in the early stages at least, is only palliative.

When the secondary symptoms are obscure, that is, when the roseola eruption is scarcely recognizable and there are few or no mucous patches in the mouth, it is far too common for the physician to congratulate his patient upon the mild type of the disease and the consequent rapidity of recovery. After a few weeks, or at most a few months, treatment is wholly discontinued and such cases may not again be seen until the disease returns in a form a hundred-fold more severe and obstinate than when first observed. It may manifest itself in the form of attacks of epilepsy, hemiplegia, general paralysis, or complete blindness. Although there may be some eye diseases as there are general diseases, which run a certain course and terminate spontaneously in perfect recovery, syphilitic neuro-retinitis never does. Without treatment it is sure to end fatally. The most skilful treatment, even when begun at an early stage of the disease, may prevent a fatal termination in many cases, yet how often does it happen that life is rendered miserable and sad by partial or total blindness. I know there are many who consider large doses of potash, a hundred grains and upward, the only remedy in nerve-syphilis, and while I believe it of great value in arresting rapidly the disease in some severe or dangerous cases, I do not think it compares with mercury in eradicating the syphilitic poison. The manner in which the mercury should be used is of secondary importance. For years I relied mainly on inunctions, but there are many objections to such a method of treatment. Where it is possible to have a trained attendant, and the expense is not to be considered, I presume there is no better or more effective method of treatment. Of the different methods of hypodermic injections, I have never been well pleased until recently; either they have been too slow or too rapid in being absorbed. A number of years since, Julius Althaus, M.D., London, suggested a preparation of mercury for a hypodermic injection, which overcomes both objections. The preparation consists of:

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[1] Read at the meeting of the Illinois State Medical Society.

Metallic mercury, 1 pt.
Lanolin, 4 pts.
Carbolic oil, 2 per cent., 5 pts.

10 minims of which represent 1 gr.

The usual dose, 5 minims, may be gradually increased to 10, giving an injection once a week in the region of the glutei muscles. In whatever form mercury may be given it is of great importance to determine the condition of the kidneys, the chief eliminator. Should albuminuria be present, mercury must be given in small doses and the condition of the kidneys carefully watched.

There is little or no pain produced in giving the mercury in this manner, and only the ordinary care as to cleanliness, necessary. Patients sometimes complain of pain in the lower limbs for a day or two afterwards, but it gradually subsides without leaving any unpleasant effects. Owing to the carbolized oil, the preparation can be kept indefinitely. As these injections are given but once a week, the patient is not subjected either to great expense or inconvenience. He is also placed upon gradually increasing doses of iodide of potash, but not to exceed 120 grains three times daily. Tobacco, both smoking and chewing, spirits, and all excesses absolutely prohibited. In those cases of tolerably good health, where they eat and sleep fairly well, the mercury may be a sufficient tonic. In anæmic cases, where the appetite is poor and digestion bad, general tonics may also have to be given, for example, iron, preferably the perchloride, quinine, maltine, with hypophosphites and cod-liver oil. I would beg to call your attention to a few illustrative cases.

Case I.—Mr. B., aged forty-eight, a diamond dealer, contracted syphilis in 1876. Secondary symptoms were slight. The disease was diagnosticated and the patient treated by a well-known specialist. The treatment, which was principally mercury, was more or less constant for two years, when all treatment was discontinued. In 1890, fourteen years after infection, I first saw the case. Aside from being exceedingly irritable and some pain in the occipital region, he was fairly well. His principal symptom of nerve trouble, and the one which caused him to seek advice, was a constant and most annoying yellowish tint to all objects. His most beautiful and clearest diamonds appeared only third- or fourth-rate on account of this yellowish tint. There was no apparent change in the fundus of the eye; the vessels and color were normal. He was placed at once upon inunctions of mercury, and gradually increasing doses of potash. While the pain in the head and general irritability became better, his vision grew worse. Within two months from the time I first saw him, neuro-retinitis made its appearance in both eyes. Dr. Hotz of Chicago and Dr. Knapp of New York also saw him, and both quite agreed in the diagnosis. Later, he took a course at Hot Springs, Arkansas, and while vision was for a time improved he soon lost what little sight he had, complete atrophy succeeding the neuro-retinitis. At the present time, aside from blindness, his condition is as good as ever; he sleeps well and appetite is good; no subjective or objective symptoms of disease.

CASE 2.—Mr. C., aged thirty-one, farmer and general laborer. Hard chancre 1892; was treated for about one month with small pills, presumably mercury. In 1894 vision began to fail in right, and very soon after in left. At that time he visited Hot Springs, Arkansas, and was treated by inunctions and potash; treatment lasting about one month. First came under observation November, 1896. Headache constant, but worse at night. Appetite poor; appearance, pale and emaciated. V R $\frac{15}{60}$, L $\frac{15}{40}$, neuro-retinitis and choroiditis. Was placed at once upon hypophosphites and small doses of bichloride. Afterwards hypodermic injections of mercury and lanolin, as already given, and gradually increasing doses of potash. On account of his general condition being so poor, the potash was not given in larger doses than 60 grains three times a day.

After a few weeks' treatment, headaches wholly disappeared, and vision has much improved. Dr. Chas. H. Beard has kindly made a drawing of the fundus as present seen. V R $\frac{15}{20}$, L $\frac{15}{30}$, which is somewhat surprising considering the changes that have already taken place.

CASE 3.—Mr. N., aged thirty-two, railway brakeman, contracted syphilis in 1892; was treated irregularly for one year, no treatment subsequently. In December, 1896, was obliged to discontinue work as he could no longer distinguish signal lights. During the next few weeks his vision became rapidly worse. When seen in February, 1897, V L $\frac{15}{60}$, R $\frac{15}{70}$. At once hypodermic injections of mercury and increasing doses of potash were given. Dr. Beard has also kindly made a drawing of this case.

V at the present time normal: L $\frac{20}{20}$, R $\frac{20}{20}$.

Color sense also perfect.

CASE 4.—Mr. K., aged twenty-eight; ship carpenter, had chancre, 1889. Was under treatment only a few weeks. Two years subsequently, was treated for one month at Hot Springs, Arkansas. No other treatment. Came under observation March, 1897. V L $\frac{15}{30}$, R $\frac{15}{40}$. Neuro-retinitis. Central scotoma for red in right eye and beginning in left. Received hypodermic injections of mercury, and general tonic treatment. Vision now nearly normal: L $\frac{15}{20}$, R $\frac{15}{30}$.

CASE 5.—Mr. D., aged forty; wholesale drygoods, contracted syphilis in the latter part of 1885. Secondary symptoms obscure. Was treated a few months with protiodide of mercury and apparently cured. Shortly after, he went abroad on business and while absent consulted a well-known specialist, who placed him upon mercury with chalk, which he took more or less continuously for two or three years, and then discontinued all treatment. He came under my observation in January, 1897. Had been having headaches for two or three months, particularly at night, which had become much worse the last few weeks, so much so as to prevent sleep. Bilateral neuro-retinitis with central scotoma for red in each eye. V L $\frac{15}{40}$, R $\frac{15}{60}$. Periosteal node of right temple. As there was some objection to hypodermic injections, and as he wished his medicine in pill-form, if possible, he was placed upon pills consisting of

Pot. iodid.,	Grs. 2.
Syr. fer. iodid.,	5 m.
Hyd. bichl.,	1/64 gr.
Liq. arsen. et hyd. iodid.,	2 m.
Tr. nuc. vom.,	2 m.

Sig., 1 to 2 after each meal.

After a few weeks' treatment the headaches completely disappeared ; vision now normal, and periosteal node hardly perceptible.

With the experience I have had, I would not place much confidence in so mild a preparation of mercury as that of mercury and chalk, however long it might be given. In those cases where mercury should be long continued and the patient seldom seen, I think the above combination invaluable. Heretofore it has been difficult to give potash in pill form, but now that it is possible it is often a convenient form for those engaged in active business and away from home.

In those cases where the color sense was early affected or an absolute central scotoma existed, vision was often more or less impaired however energetic the treatment. Treatment of these cases unless long continued will be followed by frequent relapses.

If I have succeeded in calling your attention to the prevention of these unfortunate cases, and thereby save a single being from blindness, I shall consider myself fully repaid.

SOME UNUSUAL CONGENITAL DEFECTS OF THE IRIS.[1]

PARTIAL ANIRIDIA—CORECTOPIA, SLIT-SHAPED PUPIL—PSEUDO-COLOBOMA.

By WILLIAM CAMPBELL POSEY, A.B., M.D., Philadelphia.

(*With five figures on Text-Plate V.*)

SO much has been said of late about the anomalies of the iris, and the subject has been studied so exhaustively by competent ophthalmologists, that I would hesitate to recall it to your attention were it not for the fact that I have recently had an opportunity of observing two cases, which exhibited such unique types of these conditions that I deemed their rarity would be sufficient excuse for their presentation. A further reason is the hope that the findings which I have observed in these cases may throw some light upon the etiology of this class of malformations.

Case i.—Mary F., æt. twelve years.

There was no family history of ocular defect or disease. The patient's eyes had never been inflamed, and beyond their being very sensitive to light they had never occasioned her any distress until several months ago, when she began to have headaches after reading.

The child is healthy and well formed; face is slightly scaphoid; forehead prominent; nose slightly deflected to right. Both palpebral fissures are normal in size and direction.

As shown in the Plate V. fig. 1 sketch, O D., the cornea is clear, the corneo-scleral junction being well defined. The iris

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[1] Read, in abstract, before the Ophthalmological Section of the American Medical Association, in June, 1897.

Illustrating Dr. W. C. Posey's paper.

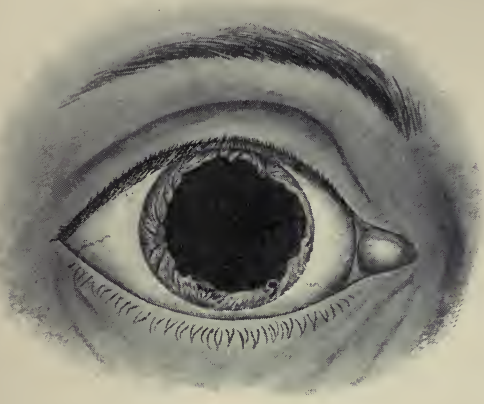

FIG. 1.

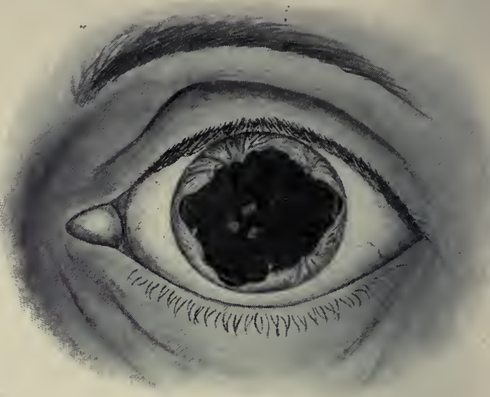

FIG. 2.

Case I.—Partial Aniridia.

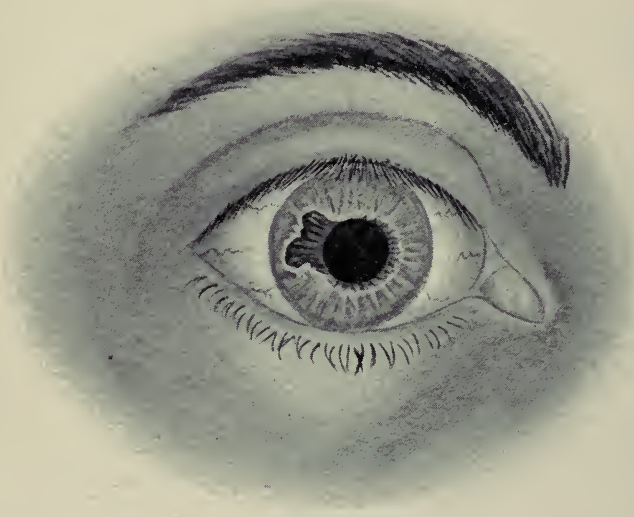

FIG. 5.

Case III.—Pseudo-Coloboma of Iris.

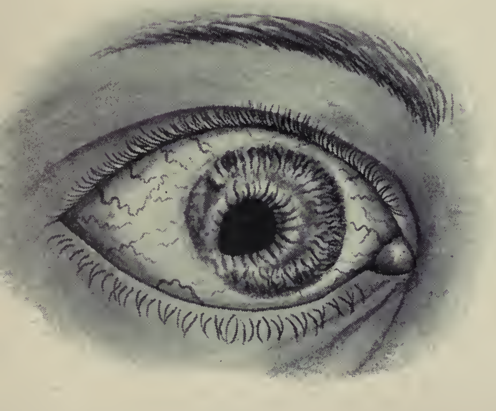

FIG. 3.

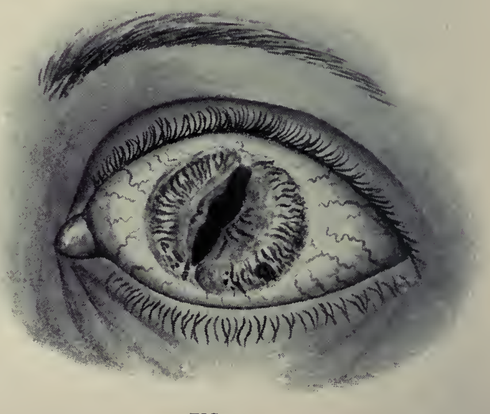

FIG. 4.

Case II.—Corectopia ; Slit-Shaped Pupil.

is rudimentary, being only 2 *mm* wide in its broadest part, and would appear from a casual inspection to consist of a ribbon-like ring with irregular edges, but without any definite structure surrounding a large black pupil. Careful study with a Hartnack lens, however, shows that the iris is made up of one well developed and two smaller and less defined roots or segments which are crescentic in form, and join with one another to form a complete ring of iris tissue. The outer half of the iris, which is about twice as broad as the inner, is represented by the largest segment, and is made up of a base of fibres running at right angles to the limbus, and of another series of fibres which converge from the periphery, both above and below. There is the suggestion of a few sphincter fibres near the pupillary margin of the iris segment, and in addition a few crypts may be seen embedded in it. There is no trace of a greater or lesser circle. The fibres which form the base of the crescent and have a general direction at right angles to the limbus, seem to be folded under the pupillary edge of the iris, and this appearance is further strengthened by the absence at this point of the narrow pigment line which borders the pupillary edge of the crescent elsewhere. The upper arm of the segment terminates directly above, at about 90°, and is slightly overlapped by the outer extremity of a second segment, whose base is up and in at about 60°. This segment is much less distinct than that just described, but has essentially the same structure. The third segment resembles the foregoing closely, its root being at about 15° off the vertical down and in. Owing to this curious structural arrangement the pupil is quadrilateral in form, with its long axis at about 45°. At the points where the extremities of the segments join one another, the rim of iris tissue intervening between the pupil and the limbus of the cornea is so narrow that there is the appearance of distinct notches in these positions. The edge of the lens, however, is not visible through them.

O S. The iris is much more rudimentary, but up and in, at an angle of about 140°, there is a well developed crescent, quite analogous to those in the fellow eye, and a much smaller one below, which conforms to the same type. These segments are parallel to one another. The edge of the lens is plainly visible at the junction of their extremities, viz., at the temporal and at the nasal side and below and slightly in, but there is no overlapping of the segments. The pupil is quadrilateral, and has a general axis of

45°. The sclero-corneal margin is sharply cut, and the cornea is clear save for a small superficial triangular nebula below, which encroaches on the cornea to the extent of 2 *mm.* The pigment line bordering the pupillary edge of the iris is very narrow, being reduced to the merest trace in the outer edge, and wholly wanting on the nasal side.

Ophthalmoscopic Examination.—O D. The media are clear. The disc is vertically oval and is slightly superficially over-capillary. There is a choroidal ring all around except up. Rest of fundus healthy.

O S. There are three localized opacities in the posterior pole of the lens, although the rest of the lens is quite clear. The disc is vertically oval, and is slightly superficially over-capillary with some distention of the lymphatics of the retinal vessels. Rest of fundus healthy.

O D V $\frac{5}{10}$ C 1.5 D ax. 100 $\frac{5}{10}$ Ty. 0.50 D 8″ to 15″.

O S V $\frac{5}{25}$ C 1.5 D ax. 150 $\frac{5}{20}$ Ty. 1 D 10″ to 12″.

CASE 2.—Michael van P., æt. five years.

This patient was brought to me at the Howard Hospital, April 25, 1896, on account of an inflammation of his eyes of several weeks' standing. There was marked photophobia, and considerable lachrymation in both eyes, occasioned by the presence of several small phlyctenulæ on the cornea. After a few days of appropriate treatment, the eyes improved to such an extent that I was enabled to make a thorough examination of them. As is well shown in the sketch, in the right eye there is corectopia, the pupil being displaced down and out. The pupil is ovoid, its apex being directed down and out, and reaches to within 1 *mm* of the limbus. The sphincter is perfect and the iris reacts well to light stimulus.

Left eye. Slit-shaped pupil. The iris is almost halved, being composed of two concave segments, united at the corneo-scleral junction by a narrow band of iris tissue, which overlap below, whilst they are evenly approximated above. The pupil extending obliquely across the eye at an axis of about 70° is 1 *mm* wide, and reaches almost to the corneal margin.

The sphincter is fully developed in both halves, but seems to be absent at the lower and upper isthmus of connection between the segments. When shaded, the pupil dilates into an ellipse 2½ *mm* in its broadest portion, but reacts but slightly at the angles. The rest of the iris tissue appears normal.

There are no traces of inflammation other than the superficial nebulæ, the remains of the phlyctenular ulceration for which the patient sought treatment.

The ophthalmoscope reveals a slight hypermetropic astigmatism in both eyes. The media are quite clear, and there are no other evidences of departure from the normal in any other of the ocular structures. The vision is normal in both eyes. The mother said the child had eyes like a cat from his birth.

The first case is an instance of partial irideremia or aniridia, an incomplete absence of the iris. While many authors would lead us to believe that instances of total absence of the iris do exist, although uncommon, it is probable that in the majority of cases the iris is present, but to such a rudimentary extent that it is hidden from clinical observation by the opaque corneal border. Despagnet, indeed, goes so far as to say that there is in all cases of aniridia some trace of iris tissue at the periphery.

Although the existence of a rim of iris tissue has often been referred to previously, after a careful study of all the reported cases of partial absence of the iris, I have failed to find any description of the structure of this rudiment in instances which correspond to the findings which I have recorded in the notes of my first case, and I believe the observation of the findings there, *i. e.*, its segment-like character, to be quite unique.

Although not noted in connection with aniridia, isolated segments of iris tissue, however, have been recorded in a number of instances. Lusardi[1] reports a case of complete aniridia in the right eye, while in the left there was only a half-moon-shaped segment visible at the lower portion of the cornea, about a line in breadth. There was a small capsular opacity associated with it. Henschel[2] cites a similar instance. The structure of both of these segments was passed upon by Sichel, who examined them under high power and found that they consisted of iris tissue. Hedinger[3] saw only a lower segment. Wallisford[4] one down and out, and Cazentre[5] one in, and another directly opposite out. Sichel[6] gives a beautiful illustration of a segment, which was situated down and out, and Rindfleisch[7] has written a full description and has added an excellent sketch of a similar structure which occurred on the temporal side of an eye otherwise bereft of iris tissue. The fellow eye exhibited no trace of iris. In this case the segment of iris corresponded exactly with those cited in my first case; it was crescentic in form, and was provided with a narrow pigment line on its free border, with a suggestion of a small iris circle and sphincter at the broadest part, and with a series of fibres which converged towards the root.

None of these authors has vouchsafed any attempt at explanation of what these segments are or what their origin may be, and as no microscopical study has ever been made of one of them, any theory which might be advanced regarding their genesis would be purely hypothetical. From what we already know, however, of the embryology and organology of the eye, it seems to me to be possible to draw some deductions which may explain their occurrence and give us substantial aid in elucidating and elaborating the different steps in the normal development of the iris.

We know that the root of the iris, *i. e.*, the marginal portion of the secondary optic vesicle from which the iris springs, is essentially a vascular tissue, consisting of but little more than a network of blood-vessels, supported on a delicate connective tissue, which is derived from the endothelial layer and a few spindle cells from the anterior layer. The vessels are formed through the union of the long and anterior ciliary arteries, which anastomose to form the major circle of the iris. From this circle small branches are given off which run inwardly between the cornea and the lens, and represent the chief blood-vessels of the iris. Each of these vascular loops is surrounded with connective-tissue cells which become the stroma of the iris. These vascular twigs with the proliferating cells about them protrude into the anterior chamber and viewed at this stage would represent, to my mind, a segment quite analogous to those which have just been referred to, and if the process of development stopped here, we would have an appearance similar to that noted in my first case, *i. e.*, a number of more or less isolated roots or segments. Later a union of these segments occurs and the complete iris is formed, the ring-like character of the pupil being given it as a result of the peculiar arch-like form of the vessels after they unite to form the minor circle.

If these segments represent, as I believe, the proliferation of tissue around a twig of the major circle of the iris, and if the iris really grows in this manner, through a primary protrusion of these twigs, then the explanation of many forms of anomalies of the iris would be a simple matter, for we need only suppose an absence of one or more iridal capillaries to account for a defect in the membrane in any position or to any extent, and the occurrence of the isolated segments which have been cited would be readily explained. Although this theory is hypothetical, all others which have been advanced to explain anomalies of the iris are also liable to the same reproach, for they are all founded upon clinical observation and insufficient microscopical proof. The theory of a vascular origin to explain these anomalies is not a new one, for in the beginning of the century Arnold[8] and Seiler[9] drew attention to the fact that if there be an anomalous distribution of the long and short ciliary arteries, or if one or all of these vessels be absent, then the iris could only partially develop, and that coloboma of that membrane could be readily accounted for in this way. The idea that these anomalies are the result of an anomalous distribution in the vascular supply agrees also with the most recent observations upon their causation, for no less an authority than Bock[10] says that the greatest importance must be attached to the vascular system and its anomalies under all circumstances in studying coloboma of the eye.

Hess's[11] theory, which attributes the coloboma to the hindrance offered to the ingrowing of the iris by the presence of connective-tissue bands, the remains of blood-vessels, also favors the theory of circulatory disturbance, for Ginsberg[12] has pointed out that these bands could only operate in two ways, either mechanically similar to the action of the amniotic bands, or by inducing a change in the circulatory conditions of the iris, as a result of the patulency of certain iridal vessels. Manz[13] and Plange[14] also, both of whom have made extensive researches upon the subject, while they do not mention the possibility of an anomalous distribution in the vessels of the iris originating congenital defects in that membrane, believe that the persistence of the pupillary membrane, which the latter author attributes either to abnormally developed vessels, or to a union of the vessels of the sac with the capsule of the lens, offers an obstacle to the protrusion of the iris between the lens and the cornea, and thus acts as a causal factor in the genesis of coloboma of the iris.

The theory advanced by Rindfleisch,[15] of an intra-uterine inflammation of the tissues about the corneal limbus and the obstruction offered to the protrusion of the iris into the anterior chamber by the consequent adhesion between the cornea and lens, cannot hold in cases where the ring of opacity in the cornea resulting from such an inflammation is wanting, or where there are no other evidences of a fœtal inflammation. This theory also seems to me to have the same objection as that offered by Tockus[16]. This author advanced the hypothesis that the growth of the iris is impeded as a result of increased intra-ocular tension, whereby the iris becomes pressed against the cornea. Both of these theories suppose the existence of conditions which would close the angle of the anterior chamber, and as the most common result of this is glaucoma, we would expect to find glaucomatous symptoms in many if not all of these cases, whereas we know that the association of glaucoma with malformation of the iris is an extremely rare affection.

You see then, gentlemen, that all of these theories which have been proposed to explain these conditions have their objections, and while that which I advance is purely hypothetical and has never been subjected to microscopic proof, to me it is a most attractive one, for it is more comprehensive than any of the others, and when we consider the frequency with which anomalies of the retinal vessels are met with, as well as those of the vascular tunic of the lens, it seems to me that we are obliged to admit the possibility of an anomalous supply in the iris, and the consequent asymmetrical development which it would occasion.

Moreover, the existence of a close phylogenetical relationship between different anomalous conditions of the iris as suggested by the presence of different anomalous conditions in the same subject in so many instances, finds ready explanation by this theory. Suppose some slight irregularity in the proper distribution of one of the twigs—and corectopia would result; suppose that one of these twigs were entirely absent, and coloboma is explained; suppose the anterior or long ciliary artery were absent, one or both, and we would have a coloboma of the iris which would involve its root, the ciliary body, and perhaps the choroid as well. The cases of corectopia, reported by Best,[17] which are associated with coloboma, irideremia, and polycoria could all be readily accounted for, as could the observations of Lusardi,[18] Villards,[19] Manz,[20] and Rindfleisch[21] of a segment of iris in one eye—and aniridia in the other, as well as my second case, in which there was corectopia in the right, and a typical coloboma in the other eye.

In this case the left iris consists of two segments of iris tissue, semilunar in form, which are joined at their extreme points, the one slightly overlapping the other. Imagine a union between the two upper and the two lower extremities of these segments, and what results—a pure example of atypical coloboma of the iris. Imagine a union of the upper and lower segments as well, and what results—either a normal iris, or, if there had been some hindrance to the proper accomplishment of the act, a corectopia. Indeed, there is no anomalous condition of the iris which cannot be moulded by a union or non-union of these segments, and I believe that we have in them the missing link, as it were, which proves the transitional nature of all anomalies of the iris, and demonstrates that they all represent but different stages or degrees of interference with the normal vascular supply of that membrane.

As a result of the curious conformation of the left iris, just described, my second case presents another interesting and very rare anomaly, a slit-shaped pupil, which extends diagonally from the upper and outer limbus of the cornea to the lower and inner corneal margin.

After quite an extensive search through ophthalmic literature, I have been unable to find but few cases which had any resemblance to it. Wilde[22] gives a sketch of a case seen by Mr. W. W. Cooper, where the pupils represented, in their contracted states, a fine transverse line extending nearly across the outer breadth of the irides, but dilating into an elliptical aperture in a modified light, or under the influence of belladonna. The vision was perfect, and there was no hereditary tendency to other malformations of the eyes. No mention is made of the structural appearance of the iris, and as the sketch is crude it is impossible to say whether there were two distinct segments, as in the case which I have reported, or not.

Tourtual[23] observed a somewhat similar case, and Chodin[24] has reported an additional instance where the pupil had the same direction as in the case I have just cited, *i. e.*, from up and out to down and in. There was a slit-shaped pupil in the other eye, with a general direction perpendicular to that of the fellow eye.

In both of these eyes there were evidences of inflammation of the cornea which led Rumskewitsch[25] to question whether they should be regarded as actual malformations.

Cornaz[26] cites two additional cases. In the first, which was observed by Bloc, there was a history of the transmission of the anomaly through several generations. The second was seen by Rites. The history of this case is very meagre, for the author merely states that he observed such a peculiarity of the pupil in one of his cases.

Through the kindness of Dr. Charles A. Oliver I am able to present another instance of segment defect in the iris, one in which the anomaly involved a part of but one layer of the iris, the anterior or mesoblastic, the posterior or epiblastic being developed normally throughout the entire extent.

As is strikingly shown in a water-color drawing, from which plate 2, Fig. 3 has been sketched, the pigment layer of the iris is exposed to view over an irregular quadrilateral area to the temporal side, owing to an absence of the stroma of the iris at this point. At the root of the iris, the stroma, however, is still present, and when it is subjected to close scrutiny the rim or root is seen to be analogous to the segments cited in the two previous cases, and the defect may, I think, be explained similarly to them.

It is interesting to note that Franke[27] observed a case where the pigment layer was absent, but the stroma present over an area which closely resembled that of the case just cited. These occurrences do not seem strange if we consider the comparative independence of the layers of the iris, during the development of that membrane. Both protrude into the anterior chamber at about the same time, but there is no union between them until the minor circle of the iris has been formed. It is probable, however, that the proper development of the posterior layer is dependent in a measure upon the presence of the anterior, for, as we have seen, it is the protrusion of the vascular twigs with the proliferating cells about them, which gives the impetus to the further formation of the iris. Should the development of the anterior layer be retarded, therefore, further protrusion of the posterior layer would probably cease also. This occurred in the first case of partial aniridia, a narrow line of pigment being plainly visible all around the iris ring. In the case just cited, however, it would seem that the impulse given the posterior layer from the almost perfectly developed anterior portion of the iris was sufficient to cause it to develop in the gap occasioned by the break in symmetry of the iris tissue. The iris in the fellow eye was normal.

Through the courtesy of Dr. H. Knapp, I am enabled to add the notes of a fourth case, seen by him in his clinic, in which there was a typical coloboma in one eye and polycoria in the other. This case was seen in another clinic, and is reported by Dr. Schapringer[28] in the *New Yorker Med. Monatsschrift*, June, 1897. In the right eye there was a large coloboma below, in the median line, while in the fellow eye the true pupil, which was smaller than normal, was slightly displaced toward the nasal side. To the temporal side there were three accessory pupils, oval in form, with their long axes horizontal. They comprised all of the layers of the iris, and were separated from one another by rather broad bands of tissue. All three pupils were situated on the temporal half of the iris in a segment-shaped area, the rest of the membrane being normal. In addition to the accessory pupils, this segment exhibited the additional peculiarity of consisting of but one layer of iris tissue, the posterior, the anterior being absent.

This case is a further example of the co-existence of different types of anomalies of the iris in the same subject, and is of interest as it shows the origin of the polycoria in a defect in all of the layers of the iris.

BIBLIOGRAPHY.

1. LUSARDI : v. Ammon's *Zeitschrift*, vol. i., p. 140, 1827.
2. HENSCHEL : v. Ammon's *Zeitschrift*, vol. i., p. 140, 1827.
3. HEDINGER : Himley's *Lehrbuch*, vol. xii., p. 178.
4. WALLISFORD : Himley's *Lehrbuch*, vol. xii., p. 178.
5. CAZENTRE : Himley's *Lehrbuch*, vol. xii., p. 178.
6. SICHEL : *Iconographie Ophtal.*, Pl. xxxvii., Figs. 4, 7.
7. RINDFLEISCH : *Archiv f. Ophtalmologie*, xxxvii., 3, p. 12.
8. ARNOLD : *Anat. und phys. Unters. über das Auge des Menschen*, 1832, p. 151.
9. SEILER : *Annal. d'Oculistique*, vol. vii., p. 179.
10. BOCK : *Coloboma des Auges*, p. 179.
11. HESS : *Klin. Monatsbl. f. Augenheilk.*, 1892, p. 104.
12. GINSBERG : *Centralbl. f. prak. Augenheilk.*, Sept., 1895.
13. MANZ : *Graefe-Saemisch*, vol. ii., p. 91.
14. PLANGE : *Arch. f. Augenheilk.*, vol. xxi., p. 94, 1890.
15. RINDFLEISCH : *ibid.*
16. TOCKUS : "Ueber die Irideremia totalis congenitalis," *Diss. Inaug.*, Strassburg, 1888.
17. BEST : *Corectopie*, Heidelberg, 1894.
18. LUSARDI : *loc. cit.*
19. VILLARDS : v. Ammon's *Zeitschrift*, vol. v., p. 79, 1834.
20. MANZ : *loc. cit.*
21. RINDFLEISCH : *loc. cit.*
22. WILDE : *Malformations of the Eye*, p. 91.
23. TOURTUAL : cited by Cornaz, *Abnormités Congén. des Yeux*, 1848, p. 80.
24. CHODIN : cited by Rumschewitsch, *Graefe's Archiv*, vol. xxxvii., p. 4.
25. RUMSCHEWITSCH : *loc. cit.*, p. 51.
26. CORNAZ : *Annal. d'Oculist.*, 1850, p. 36.
27. FRANKE : *Centralbl. f. prak. Augenheilk.*, vol. ix., p. 85.
28. SCHAPRINGER : *N. Y. Med. Monatsschrift*, June, 1897.

PARESIS OF THE EXTERNAL RECTUS FROM INDIRECT VIOLENCE.

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THE following obscure case came under my observation in October, 1894, and gave this history:

On March 31, 1894, a trolley car collided with the wagon in which the patient was driving, and he was thrown violently to the ground, striking on the left side of his body. He was, when picked up, suffering great pain, and was removed to a hospital, where a severe contusion was found over the region of the heart. The surgeon at the hospital did not notice any trace of injury about the head, and was positive that no symptoms of concussion of the brain were present. Three days after the accident the patient left the hospital, returned home, and summoned his family physician, who discovered a valvular cardiac murmur to be present, although none had previously existed, an evidence that the heart had received injury from the traumatism. This murmur remained permanently.

Six months later his physician referred him to me on account of the diplopia with which he was troubled. He stated that from the time of the accident he had been unable to read for ten consecutive minutes without diplopia, and that this also appeared at all times when he became tired or nervous.

On examination I found a paresis of the external rectus of the right eye, characterized by imperfect outward rotation of the eye, associated with diplopia, which increased as the eyes were rotated to the right, with parallel images. During the early part of the examination this diplopia was confined to the right side of the field, separated from the area of binocular single vision by a line which ran from about 10° to the left above to 20° to the right below the horizontal meridian, thus passing a little to the right side of the line of central vision. The patient had therefore binocular single vision when his eyes were directed straight ahead, but a prolonged examination demonstrated that the right external rectus easily became fatigued, a condition which resulted in a displacement of this dividing line to the left, so that diplopia ensued while the eyes were in the same position as before.

With the proper correction the vision in each eye was $\frac{20}{20}$. The field of each eye was perfect. No lesion within the eye could be found with the ophthalmoscope. I could not elicit from either the patient or his physician a history of any disease which is known to be capable of producing such a condition. On the contrary, both agreed in ascribing the diplopia to some injury received at the time of the accident, and, in spite of the obscurity of the lesion, his physician could not suggest anything from his knowledge of the patient which would aid in clearing the diagnosis.

In July, 1895, the patient informed me that his condition remained the same, but I was unable to persuade him to come to my office for another examination, and have not since then heard from him.

The only similar case of which I have found a record is one mentioned by Dr. Noyes in the second edition of his treatise on *Diseases of the Eye*. In that case, a gentleman was thrown from a horse, struck on the left shoulder and left side of the head, and was stunned, but did not lose consciousness or vomit. Subconjunctival ecchymoses appeared in both eyes. On the following day, he had ptosis of the right eye and diplopia. When reported, the ptosis had practically disappeared, but the diplopia required for correction a prism 10° base up and a prism 15° base out over the right eye. The diagnosis made was that of probable injury of the wall of the right orbit, and as the patient struck on the left side of the head this was a possible result.

In both of these cases the patient was thrown violently upon his left side, and sustained an injury which affected the external rectus of his right eye. In my own case I consider fracture of the orbital wall to be in the highest degree improbable. The injury appears to have been permanent in its nature, and its probable explanation would seem to be that the injury affected the abducens and was dependent either upon the cardiac lesion, or, if independent of this, upon a slight and unnoticed degree of concussion of the brain.

THE NORMAL DIRECTIONS OF THE PLANES OF VISION IN RELATION TO CERTAIN CRANIAL CHARACTERISTICS.

By GEORGE T. STEVENS, M.D., Ph.D., New York.

IN regard to the ability of the eyes to rotate in the vertical direction, I have found that, under the best conditions, the full extent of the excursion amounts to about 83° of arc, and that of this excursion 50° is below the horizontal plane and 33° above it. This adjustment, since it is found to be the most favorable to the continued use of the eyes, and since it exercises no unfavorable influence in inducing either lateral deviations or tendencies toward deviations, and since also it induces no excess of the torsional effect in the act of convergence with depression of the plane of regard, may be expressed by the term *Eutropia*, meaning a favorable adjustment.

If the total excursion of the eyes remains of about the same extent (83°), but if the ability to rotate them upwards is materially greater than in eutropia, that is, if it equals or exceeds 36°, while the downward rotation is restricted to a corresponding extent, the condition is that of *anophoria;* while a failure to rotate the eyes up to the extent of, say, 30°, while the downward excursion is increased, is designated as *katophoria.* It will be observed that a margin of 3° on each side of the standard of upward rotation for eutropia (33°) is regarded as within the limits of this condition. In the great majority of cases this is practically correct, yet there are instances in which this margin is too great either in respect to the physical, that is the mechanical, effects upon the eyes, or in respect to the absence of asthenopia or other nervous manifestations.

In order to obtain exact and uniform measurements of the excursions of the eyes, the head of the person observed is to be placed and maintained during the examination in a position such as has been elsewhere described.[1]

Very soon after bringing the tropometer to its present state of adaptability to its purpose, and learning something of the peculiarities of ocular rotations from more critical methods than had hitherto been employed, it became evident that certain peculiarities in the excursions of the eyes, in the vertical direction especially, were, as a rule, associated with certain types of the cranium. The more attention was directed to these coincidences the more certain did it appear that there was, in this relation, an important law which would well repay more than a casual thought.

As investigations proceeded it was found that three classes of ocular conditions were in close relation with the three great types of crania recognized by anthropogists and craniologists, and that the facial angles also, with some modifications from the usual rules of craniological measurements, serve as the indications of the directions of the eyes with reference to the horizon in passive adjustment.

In order to obtain a clear conception of this law, so far as it has been developed, some knowledge of the types of the cranium and of some of the angles of the face is requisite.

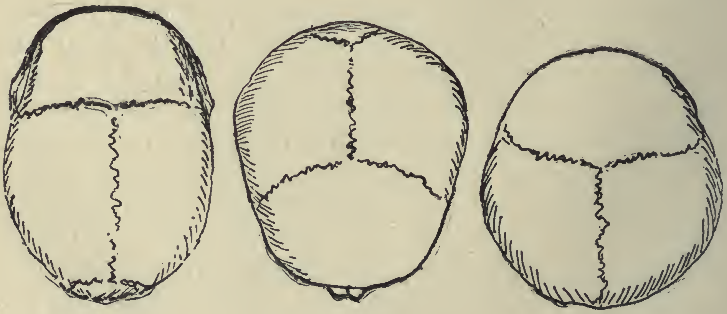

Fig. 1. Fig. 2. Fig. 3.

The long, medium, and broad skulls as seen from above.

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[1] *Ophthal. Record*, April, 1897.

Craniologists classify skulls as : *Dolicho-cephalic* (long skull), *Meso-cephalic* (medium skulls), and *Brachy-cephalic* (broad skulls).

Figure 1 shows the general shape of the long (dolicho-cephalic) skull as seen from the top ; Figure 2 a medium (meso-cephalic), and Figure 3 a broad (brachy-cephalic) skull.

These three types are distinguished by what is known as the cephalic index, which is the proportion the breadth of the head bears to its length, assuming that in every case the length is represented by 100.[1]

In the meso-cephalic skull the cephalic index is about 80, while if the index is as low as 75 the skull is long, and if as high as 85 or exceeding that figure it is a broad skull.

Associated with each of these three types of crania are found also distinct types in the form of the orbit, thus with the long skull the orbit is long and low, in the medium arched and high, and in the broad skull long, low, and obliquely placed (see Figs. 10–12).

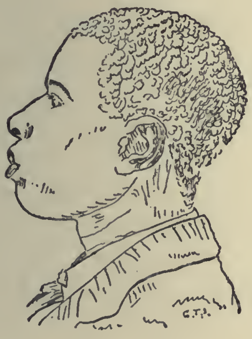

Fig. 4.—The Prognathous Face and Dolicho-cephalic Head. Facial angle, + 15° ; upward rotation, 28° ; downward, 55°.

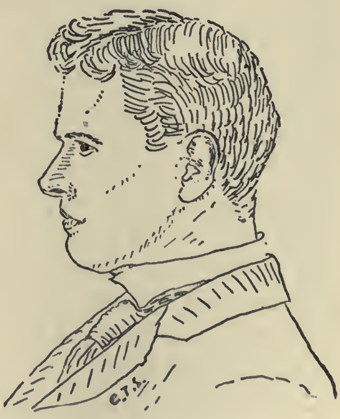

Fig. 5.—The Orthagnathous Face and Meso-cephalic Head. Facial angle, 0° ; upward rotation, 42° ; downward, 45°.

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[1] For example, suppose that the greatest antero-posterior length of a given skull be 19 centimetres and the greatest breadth 15.2 centimetres ; then, 19.0 : 100 :: 15.2 : 80. That is, the cephalic index in this case would be 80, the breadth being 80/100 of the length.

If the facial angle is low, the line of the face being nearly straight, as in the typical European face, the face is said to be *orthagnathous.* If the angle is high, as in the typical African face, it is *prognathous;* and if the angle of the face is negative, the face being concave or hollowed in, it is *opisthagnathous.*

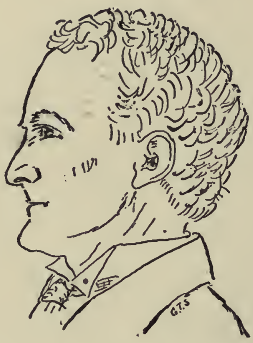

FIG. 6.—The Opisthagnathous Face and Moderately Brachy-cephalic Head. Facial angle, — 10° ; upward rotation, 22° ; downward, 40°.[1]

Figure 4 is an example of the extreme prognathous face, and Figure 5 is an example of an orthagnathous face. Figure 6 shows the opisthagnathous form. These figures I have drawn from cases in which I have carefully tested the vertical rotations. The extent of vertical rotations given in each case, while, of course, applying only to the individual, fairly represents the state of the vertical rotations which may be found in heads of similar form with similar facial angles.

If we examine a large number of heads we shall find that prognathism is very commonly associated with the long head, orthagnathism with the medium, and opisthagnathism with the broad head.

While authorities are agreed in regard to the indices which characterize the three types of head, they are less in accord in regard to the situation of the angle which constitutes prognathism, for while Broca and his French colleagues estimate prognathism by the angle formed by the alveola with a specified base line, Benedikt and his German associates estimate it from the angle formed by the line drawn from the middle of the root of the nose to the lower border of the upper jaw and the basal line already mentioned.

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[1] From drawings by the author from cases in which the ocular rotations had been carefully determined.

In the examinations which I have made bearing upon the relations of horizontality of vision to the various heads and faces of living persons, some departures from the lines laid down by craniologists, who conduct their researches largely on dead skulls, have been found necessary.

In order to arrive at any precise results regarding the excursions of the eyes, it was essential that points be selected by which perfect uniformity in all examinations should be maintained in respect to the vertical position of the head.

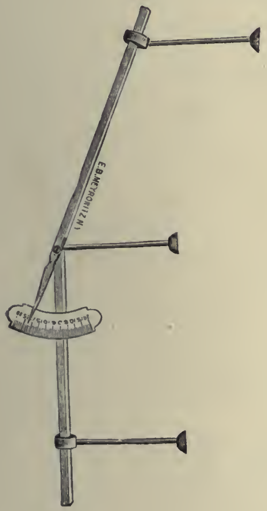

FIG. 7.

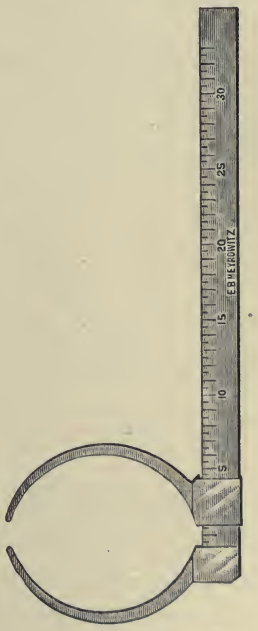

FIG. 8.

Stevens's Facial Goniometer and Craniometer.

Two points, the upper being the slight elevation in the median line between the two superciliary ridges, the lower the convexity just below the nasal spine, were selected as points which should, in every case, be in a vertical line when the head is in the primary position. This vertical line varies slightly from a vertical which would be drawn at a right angle with Broca's horizontal line of the skull, but this latter line is impracticable in the living subject. In respect to prognathism the angle is measured from the point between the superciliary ridges, the concavity in the upper jaw below the nasal spine and the tip of the chin, the feet of the goniometer in each case being pressed firmly toward the bone. The upper angle of the face has for its three points the sulcus below the nose, the point between the superciliary ridges and the summit of the convexity of the forehead. This latter angle is, so far as my measurements have indicated, more variable with respect to the general classification of skulls than that of the lower part of the face.

A third angle, corresponding practically with the angle of Jaquart, is measured from the upper wall of the meatus auditorius, the sub-nasal point, and the point between the superciliary arches. This angle is usually greater in proportion as the head has more of the orthagnathous character.

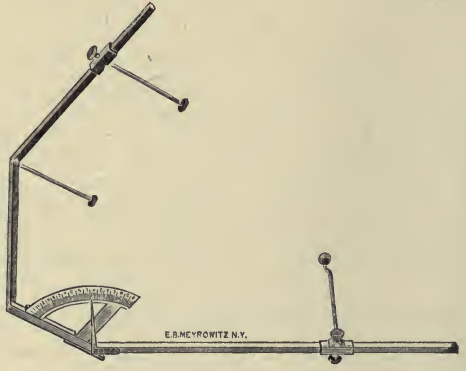

FIG. 9.—Instrument for Measuring Angle of Jaquart. Designed by Dr. Charles W. Stevens.

A craniologist will discover in these measurements deviations from the established rules, but these appear to be demanded by the circumstances. The measurement of prognathism by including the lower jaw appears to me to have more importance than is assigned to it in classical works. It certainly bears a very noticeable relation to the directions of the planes of vision.

Thus, having very briefly outlined certain elementary principles, first in respect to the rotations of the eyes, and then in respect to some cranial and facial characteristics, we are prepared to inquire whether certain states of the excursions of the eyes in the vertical directions are so commonly associated with certain cranial and facial peculiarities as to constitute a general law.

To this inquiry I am prepared to give an affirmative reply, while at the same time conceding that there is still much room for investigation and for classification of data.

The results of a series of carefully recorded observations of ocular rotations and of cranial and facial measurements continued during the past year may be briefly summarized as follows:

1. The condition which I have called eutropia is extremely rare. In not less than five hundred cases in which careful trials by the tropometer have been made since the present state of the instrument has been reached, less than one per cent. of the cases could be regarded as within the term, and of these some are doubtful as not having acquired an experience in making the efforts at ocular rotations which would warrant the assertion that the record from a few examinations proved the condition of eutropia. In the great majority of cases after sufficient practice, the upward vertical rotation either falls below 30° or exceeds 36°. There is thus an interval of about 5° to 7° in the records of upward rotation within which the limit of the excursion is rarely found.

In the class in which the upward rotation exceeds 36° it sometimes reaches 50°, or even more, while in the other class in which it fails to reach 31° it may fall as low as 15°, or even lower. Whether, in a greater number of examinations, this interval in the region of eutropia will be filled remains to be seen, but the fact of this hiatus may perhaps be compared with the remark of Benedikt,[1] that in the measurements of a great series of skulls he has not found a case of orthagnathism.

2. In meso-cephalic heads with approimaxte orthagnath-

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[1] Benedikt, *Kraniometrie und Kephalometrie*, Wien und Leipzig.

ism, the rotation of the eyes is usually high with corresponding restriction downwards. For example, if the upward rotation is 40°, the downward rotation is liable to be restricted to 40°, or possibly 45°, as there is a greater latitude in this than in the upward rotation. If the head is quite high in proportion to its length, the upward rotation, as a rule, rises somewhat in proportion to the index of height.

3. In long heads, especially long heads with a high degree of prognathism, the rotation upwards nearly always comes short of the standard, and the downward rotation exceeds 50°. In these cases the chin recedes and is usually of the type commonly known as "weak chin."

4. In very broad heads, and especially in the condition called by Benedikt and other craniologists opisthagnathism, that is, in which the angle of the face from the point between the superciliary ridges and the tip of the chin is negative, the rotation is, in nearly every instance, restricted in both directions, but more especially in the upward direction. If, however, the ability to rotate up or down somewhat diagonally, that is upward and outward or downward and inward, is tested, the extent of rotation can generally be somewhat increased.

In these cases of opisthagnathism the head is large in proportion to the face, but it is usually short in the antero-posterior diameter and consequently the cranial index is very high. The head increases in breadth from the ears up to the parietal eminence. The lower jaw is usually noticeably less heavy than in orthagnathous faces, and in nearly every instance stands out prominently in front of the face, but differing from the heavy jaw of the tall head, which is also sometimes prominent, in that the former comes to a point or almost, in many cases, to a hook.

This class of cases for a long time appeared to me altogether exceptional, and occurred with such comparative frequency as almost to seem to disprove the rule of a relationship between the facial angles and the vertical rotations. The conclusion at first seemed natural, that if a long head and a strong facial angle suggested katophoria, and if a medium head with a straight face suggested anophoria, then a very broad head and a concave facial line should indicate an extreme anotropia. That there should be a marked restriction of the upward rotation seemed inconsistent.

Referring to the figures below (Figs. 10, 11, and 12), we shall see a reasonable explanation of the apparent contradiction, and it will readily appear that the restrictions are really according to the rule.

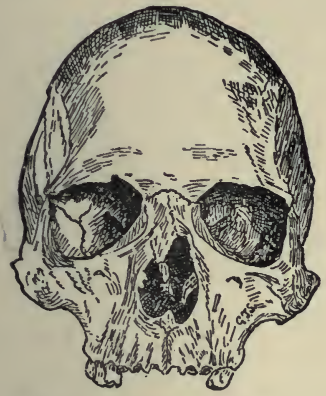

FIG. 10.—Cephalic Index 71.4:100.

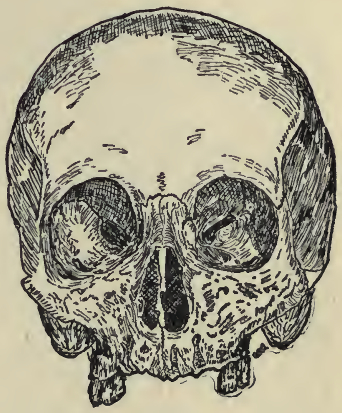

FIG. 11.—Cephalic Index 81:100.

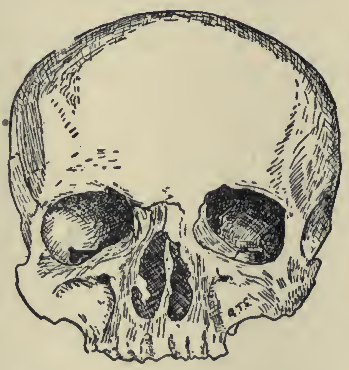

FIG. 12.—Cephalic Index 85:100.

Front views of the long, medium, and short skulls, showing the form of the orbit corresponding to each type. From drawings made by the author from specimens in the Army Medical Museum, Washington.

The figures show that the form of the orbits is quite characteristic in the three classes of skulls. In the dolichocephalic (Fig. 10), the orbit is long horizontally and low, that is, the orbital index is low, and the axis of the orbit is directed outward and downward. In the meso-cephalic head (Fig. 11), the orbit is strongly arched above, the orbital index being high. The orbital axis is directed forwards and upwards, and this direction, with the strongly arched upper wall, would conduce to an excess of upward rotation and a restriction of the excursion downward.

In the broad skulls, the brachy-cephalic (Fig. 12), the orbits are, like those of the long skulls, long and low, but they are also placed obliquely so that the line of greatest excursion would be not in the direct vertical line, but obliquely, and from the peculiarity of the form of the orbit in this class of skulls, it is easy to see that the vertical excursion both up and down should be limited.

In the cases of katophoria examined during the past six months, the average upward rotation has been 27°. The cephalic index[1] has averaged 74.07, and the average prognathism has been 7°.

In the cases of anophoria the average upward rotation has been 41½°, the average cephalic index 80.9, and the average prognathism has been 1⅓°.

In the cases in which the rotations have been restricted both in the upward and downward directions, the cephalic index has averaged 85.4, and the average prognathism is — 4°.

Placing these results in tabulated form we have:

In	Upward Rotation.	Cephalic Index.	Prog-nathism.
Katophoria	27°	74.07	7°
Anophoria	41½°	80.90	1⅓°
Rotations Restricted in both Directions	28°	85.40	−4°

Thus it will be seen that katophoria is usually associated with the long head and with the strong facial angle; anophoria with the head which is high but neither very long nor very broad, and in which the angle of the face is low; while restricted rotations both up and down are generally associated with the broad head and the negative facial angle.

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[1] Owing to the presence of the tissues external to the cranium in the living subject, the cephalic index does not express exactly the same proportion as in the case of the prepared skull.

It is not to be forgotten that in communities made up of different nationalities, many heads are composite in type, the upper part, the cranium, perhaps, belonging to one type, the lower, the face, to another. Such cases must of necessity cause greater variations from the rule which we have announced than would probably be found in a community of more common origin.

Craniologists who have made many measurements of the orbits and of their directions have not, so far as I have been able to learn, attempted to find the relations between the directions of the orbital axes and the types of crania.

This work I have attempted without the experience of the trained observer in this field and with only such material as I have been able to find in the possession of friends and in some public collections. The number of suitable crania included in my series has, therefore, been somewhat limited, yet has been sufficient to establish certain general propositions which may be formulated as follows:

In the dolicho-cephalic skull (index 78 and under) the axis of the orbit is directed below the plane of the horizon from 5° to 15° with an average of about 7° or 8° of depression. The orbital index averages about 79.

In the broad (brachy-cephalic) skull the orbital axis is also directed downwards, but in less degree, on the average, than in case of the dolicho-cephalic. Here the depression of the axis, ranging in my examinations from 4° to 12°, has averaged 6.5°. The orbital index, which has ranged from 82.9 to 87.5 has averaged 84.8.

The number of meso-cephalic skulls included in my series is too small, there being but fifteen of this class, to form a very correct estimate of the direction of the orbital axis. However, it may be said that the average direction rises somewhat above the plane of the horizon (in one case 12° above). The orbital index in these crania has averaged 86.5, ranging from 74 to 97.4.

In the determination of the direction of the axes of the crania examined, the skulls have been placed in the position chosen as the primary position of the head in the living subject, that is, with the glabella and the depression immediately below the nasal spine exactly vertical to each other.

Unfortunately for such an investigation a very large proportion of the crania found in the museums which I have visited in the pursuit of this study has consisted of the skulls of American aborigines, which, for obvious reasons do not serve the purposes of the investigation, and the number of meso-cephalic skulls is much less than the number of long or of broad skulls of the white races. The number of accessible crania, therefore, which are suited to the study is, in this country, quite limited. Before a just average of the directions of the orbits in the three principle types of crania can be determined, a larger number of skulls must be examined than I have thus far been able to observe. While the general propositions will, I think, be found to be correct, the average directions as I have here given them will most likely be found subject to modifications.

In the prosecution of my inquiries respecting the axes of the orbit in relation to the form of the crania, I have received important assistance from those in charge of the Army Medical Museum in Washington. These gentlemen not only placed the material in the museum freely at my disposal for the purposes of the examination, but they rendered me every personal assistance in their power.

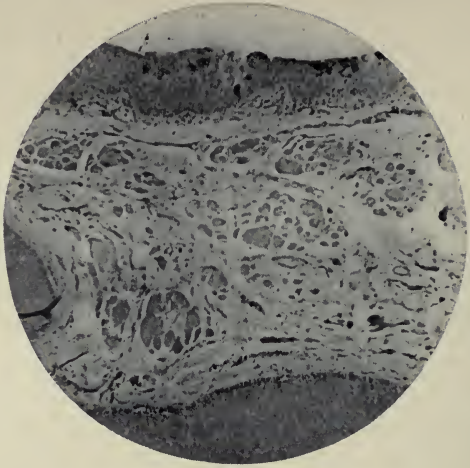

FIG. 1.

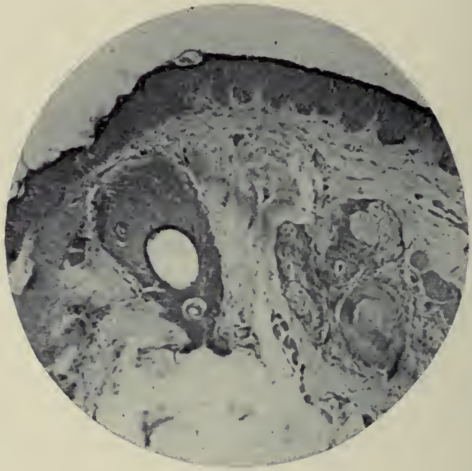

FIG. 2.

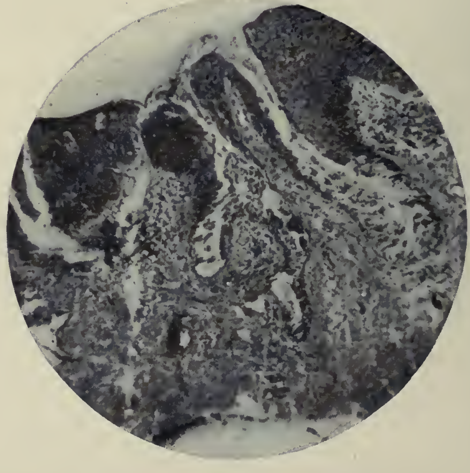

FIG. 3.

A SUPERNUMERARY CARUNCLE.

By J. W. H. EYRE, M.D.,
SENIOR OPHTHALMIC ASSISTANT TO GUY'S HOSPITAL.

(*With three figures on Text Plate VI.*)

WITH the exception of the case reported by Mr. Stephenson (*Ophth. Review*, vol. xv., Jan., 1896), I am not aware of any recorded case of supernumerary *caruncula lacrimalis*, and were it not for the striking similarity of the microscopical appearances presented by the congenital tumor about to be described to the normal caruncle, I should be extremely diffident about publishing my notes of the case.

W. H., male, aged twenty-eight years, consulted me with regard to the removal of a small tumor of the right upper eyelid. The history he gave was that the fleshy mass had been noticed at birth, and was believed by his parents to be a nævus. It had gradually increased in size during early childhood, but had remained stationary for the last fifteen years. It was in no way troublesome, but his fiancée refused to marry him until the unsightly tumor had been removed.

On Examination.—R. E. A small, raised, almost spherical tumor (three *mm* in diameter), was seen springing from the conjunctival margin of the upper eyelid, and situated in the interval between the papilla lacrimalis and the inner canthus; of a pale, pinkish color, and somewhat spongy appearance, but quite firm in consistence. The surface was invested by a layer of conjunctiva, and that portion which projected into the palpebral aperture showed a few fine hairs.

The tumor was removed, hardened in 2 per cent. formic aldehyde solution, embedded in paraffin, and sections cut. The sections were subsequently stained with hæmatoxylin and eosin.

In Quain's *Anatomy* (vol. iii., Pt. iii., page 2) occurs the following description of the normal caruncle: "A spongy-looking, reddish elevation formed by a small isolated portion of skin containing a few large modified sweat glands, as well as groups of sebaceous glands, which open into the follicles of very fine hairs. There is further found in it a small amount of plain muscular tissue as well as a few cross-striated muscular fibres."

A reference to the accompanying reproductions of photomicrographs will show that the tumor in question is accurately and exactly described by the above quotation, whilst its situation and its congenital origin are points which are decidedly in favor of its being a genuine supernumerary caruncle.

Explanation of figures on Plate.

FIG. 1.—Photomicrograph of a section of the tumor, parallel to, and about 0.5 *mm* from, its base; showing superficial epithelial layer, connective tissue, and bundles of muscular fibres. (Watson's 1 inch objective and C ocular.)

FIG. 2.—Photomicrograph of one extremity of above section, showing free surface, hair follicle, sebaceous and mucous gland tissue.

FIG. 3.—Photomicrograph of section through surface of tumor at right angles to its base, showing stratified epithelium and hair follicles. (Watson's $\frac{1}{2}$ inch objective and C ocular.)

MICROSCOPIC CHANGES IN EXPERIMENTAL CONCUSSION OF THE RETINA.

By Dr. R. DENIG.

RESIDENT ASSISTANT SURGEON NEW YORK OPHTHALMIC AND AURAL INSTITUTE.

(*With colored Plate I. of Vol. XXXIV. Germ. Ed.*)

THE white color of the retina, following the so-called commotio retinæ, was believed to be an œdema of the retina, caused by subchoroidal hemorrhages from ruptures of the choroid. I had the opportunity of observing, in experiments made on rabbits, the ophthalmoscopic picture of *subchoroidal* hemorrhages, in which I found quite a different condition from that of the so-called commotio retinæ. In subchoroidal hemorrhages a grayish-white discoloration, as if located in the deeper layers of the retina, is observed, particularly at the margins of the hemorrhage, while in commotio retinæ the discoloration is milky-white, as if located upon the surface of the retina.

The anatomical conditions, therefore, do not consist of subchoroidal hemorrhages and retinal œdema, but present typical changes in the nerve-fibre layer of the retina as follows (see Plate I.):

Corresponding to the ophthalmoscopic picture there are many small elevations in the nerve-fibre layer of the retina, strung like pearls, with alternating depressions. The thickness of the elevations is about one-tenth to one-third the diameter of the retina, the length being from three to five times the thickness. The elevations are covered by the membrana limitans, and the latter is torn at places. The ganglion cells are here displaced somewhat farther back.

The nerve-fibre layer between the elevations is slightly thickened, which is also noticed at the transition from the elevations into normal retina.

With a high magnifying power the elevations of the retina have the appearance of mushrooms, with irregularly formed openings of various sizes, strongly reflecting the light, with a yellowish opalescence. The framework took the stain, but the cavities did not.

The other layers of the retina are normal, containing between the rods and cones some spheroidal structures as exudations from the vessels of the choroid; the latter, immediately (for about thirty seconds) after the blow, become paralyzed and dilated with simultaneous hyperæmia of the optic disc; this condition could be very well observed in albino rabbits.

Subchoroidal hemorrhages are caused only by very severe blows. I have still to add, that I found the elevations and the exudation in the retina between the rods and cones, even when the discoloration of the retina was not noticed with the ophthalmoscope. If one may draw conclusions from the rabbit's eye to the human eye, it can be easily understood why, in some instances of commotio retinæ, there exists, despite a normal fundus, a diminution of peripheral and central vision in the form of a scotoma or impairment of sight.

As to the explanation of the changes in the retina, *I believe that the blow causes the vitreous to impinge upon the retina like a wave, rebounding with the same violence toward the starting-point; the same changes are, therefore, mostly observed at that latter spot.* Through the violence of the wave of the vitreous, the stigmata of Müller's fibres are distended, in some places the limitans is torn and vitreous humor is forced into the nerve-fibre layer of the retina. The latter being broken up gives rise to the above microscopic picture, and produces, if large enough, the ophthalmoscopic picture of the milky discoloration of the retina.

The vitreous humor, pressed inward, becomes gradually absorbed again, the broken-up nerve fibres unite again, and all structures return to the normal.

The fact that no harm to the nerve fibres was done, may be explained by the well known resistance of the axial cylinders, for instance, in multiple sclerosis.

BACTERIA IN THE NORMAL CONJUNCTIVA AND THE EFFECT UPON THEM OF ASEPTIC AND ANTISEPTIC IRRIGATIONS. THE STAPHYLOCOCCUS EPIDERMIDIS ALBUS (WELCH) A REGULAR INHABITANT OF THE NORMAL CONJUNCTIVA.

By ROBERT L. RANDOLPH, M.D., Baltimore, Md.

THE works of Leber, Sattler, Gifford, Gayet, Marthen, Bernheim, and others upon the bacteria of the conjunctiva are practically in accord in the opinion that the normal conjunctival sac always contains bacteria in larger or smaller number. Gelpke[1] recently expressed the opinion that all strictly normal conjunctivæ are possibly sterile, but he based this assumption upon a very limited number of observations, and even from his own figures one would be hardly warranted in drawing such a conclusion.

I recently made a series of experiments upon one hundred individuals. These one hundred persons comprised patients (not eye patients) in the dispensary and wards of the hospital, medical students, and nurses. In every instance it was objectively and subjectively clear that the conjunctiva was normal. The inoculations were upon nutrient agar, and usually "smear cultures" were made. A platinum loop, sterilized by holding it in a flame, was rubbed over the lower part of the conjunctival sac. The patient was then required to look down, and the loop was carried well up into the upper part of the sac, and finally rubbed gently over portions of the bulbar conjunctiva. I will say here that it is hardly possible, certainly not practicable, to touch every part of the conjunctiva. I doubt whether in any of these cases the platinum loop came in contact with more than half the conjunctival surface, and yet out of the one hundred experiments there were only thirteen sterile tubes. If then, inoculations from a limited area of the conjunctiva show the presence of bacteria in eighty-seven out of one hundred cases, it is more than probable that inoculations from the entire conjunctiva would show the invariable presence of bacteria.

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[1] *Graefe's Archiv f. Ophthal.*, Bd. xlii., 97.

In conducting experiments of this character, one must avoid touching either the free border of the lids or the eyelashes. This mishap will occur whenever the patient winks; and it necessitates a repetition of the experiment. It will be observed that in eighty-five out of the eighty-seven cases where bacteria were found the latter resembled each other morphologically. A whitish growth would generally appear on the agar, about thirty-six or forty-eight hours after the tubes were placed in the thermostat. In some cases this whitish growth assumed later a yellowish tinge. Under the microscope, however, there was no apparent difference in the shape and size of the organism which resembled the staphylococcus pyogenes albus.

In surgery two methods are usually employed to sterilize the field of operation; either the aseptic method, by which bacteria are removed by mechanical means (as, for instance, the irrigation of a given point with water which has been sterilized by heat), or the antiseptic method, consisting in the employment of chemicals which have the effect of either destroying bacteria, or of inhibiting their growth. Both methods were tested in two series of fifty experiments each.

First the aseptic method: Inoculations were made from fifty individuals with normal conjunctivæ. After this the conjunctivæ were irrigated three times (with an interval of five minutes between each irrigation) with water which had been sterilized by boiling, and inoculations were again made from them into agar. There was a growth in forty of the tubes representing inoculations before the employment of the aseptic irrigation. The other ten tubes were sterile, and hence are not counted in the results. After the aseptic irrigations there was a growth in thirty-two tubes, that is to say, the apparent effect of the aseptic method was to produce sterility of the conjunctiva in eight cases out of forty. It may be added that a number of control experiments showed that the water used for irrigation was sterile. It is evident from this that we cannot rely upon aseptic irrigations of the conjunctiva to produce sterility of the surface of this membrane.

Another series of fifty experiments was made. Just as in the foregoing series inoculations were first made to see if there were bacteria in the conjunctivæ, and immediately afterward these conjunctivæ were flooded with a sublimate solution, 1:5000. Five minutes later inoculations were again made from them. Before the use of the sublimate, forty-two tubes presented growth and eight were sterile. These eight are excluded. In the forty-two cases, however, where there was a growth before the instillation of the sublimate, there were nine sterile tubes after the use of this solution. It will be noted that in this last series a staphylococcus was almost invariably found just as in the first two series, and I have been surprised to find how seldom any other form of bacteria than micrococci were observed. In the first series (of one hundred) a bacillus was found in two cases. In the second series (of fifty) a bacillus was seen in one case only, and in the third series of fifty cases a bacillus occurred once.

The micrococcus which was found with such regularity in my experiments is doubtless identical with the one mentioned by Bach, Morax, and others as frequently present in the normal conjunctival sac. This coccus I have found to present the following properties: Morphologically it is indistinguishable from the pyogenic staphylococci. It stains by Gram's method. It liquefies gelatine, but does so more slowly than the staphylococcus pyogenes aureus. It grows upon ordinary culture media, the color of the growth remaining white upon potato and other media. It coagulates milk more slowly than the ordinary yellow pyogenic coccus. 0.5 to 1 *cc* injected into the ear-vein of a rabbit produced no effect. These characters suffice to identify the staphylococcus epidermidis albus described by Welch as a regular inhabitant of the epidermis and hair follicles, where it lies more deeply than can be reached by ordinary methods of disinfection of the skin.[1] As pointed out by Welch, this coccus is to be regarded probably as a variety of the staphylococcus pyogenes albus. It grows somewhat more slowly, liquefies gelatine, and coagulates milk more slowly and is less pathogenic for man and animals than the ordinary staphylococcus pyogenes albus as found in inflammatory lesions.

It is of no little interest that this regular inhabitant of the epidermis is now identified as likewise a regular inhabitant of the conjunctival sac. It can be readily understood how an organism that lives regularly in the epidermis and hair follicles should gain ready access from the neighboring parts to the conjunctival sac. We can likewise comprehend that an organism, such as this skin coccus, which has habituated itself to the conditions of life in the epidermis, should survive in the conjunctiva. Doubtless all sorts of bacteria must at times gain access to the conjunctiva, but few of these find conditions for prolonged survival there. It is only this white skin coccus which is found with such frequency in the conjunctival sac that it can properly be regarded as a regular inhabitant of this situation.

As pointed out by Welch, this skin coccus is usually a harmless invader of wounds, being found with great frequency in so-called aseptic wounds, which heal by primary union. Various accessory or predisposing causes, such as the presence of foreign bodies, of necrotic and strangulated tissue, impaired vitality of the part, may, however, permit the limited pathogenic powers of this coccus to manifest themselves. Under these circumstances this coccus may cause inflammation, even of a suppurative character, and interfere with wound-healing. Doubtless the conditions as to the pathogenic properties of this coccus as regards the eye do not differ from those relating to the skin. Ordinarily its presence is of little or no significance, exceptionally it may cause inflammation and interfere with the healing of wounds.

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[1] Welch, "Conditions Underlying the Infection of Wounds," *Trans. of the Congress of American Physicians and Surgeons*, Second Triennial Session. Sept., 1891, vol. ii.

In the last twenty-five cases in which this organism was found, it was subjected to the following test: The end of the platinum loop, after being thoroughly rubbed over the growth, was immersed in a solution of sublimate 1:5000, and allowed to remain there for five minutes. The loop was then withdrawn and plunged into agar, and in every case there was a luxuriant growth, a result which showed that the chemical disinfectant as thus applied had apparently no effect upon the vitality of the organisms. This cannot be regarded as a delicate test, for it is possible that the sublimate did not penetrate the entire mass of organisms. It did not, however, seem necessary to carry out further this line of experiment, for this white coccus is certainly not more susceptible to disinfectants than the staphylococcus pyogenes aureus, as is clear from the experiments of Robb and Ghriskey and of Sherwood.[1] Abbott[2] has shown the uncertainty of securing efficient disinfection by sublimate solutions in careful tests with the staphylococcus pyogenes aureus.

The results, however, in this last series are not surprising when we consider how profoundly shaken is the position which sublimate once held as a germicide. The experiments in this connection of Geppert, Behring, Abbott, and others are well known and need not be quoted in detail. It suffices to say that these observers showed that the early experiments of Koch as to the potency of sublimate as a germicide contained a fatal flaw. Trousseau[3] found that after disinfecting the conjunctiva with sublimate solution 1:2000, or with a solution of cyanide of mercury 1:1500, the conjunctiva remained contaminated with bacteria.

Both aseptic and antiseptic methods in my hands led to practically the same results, for by neither method was sterility of the conjunctiva secured.

I have frequently observed that persons complain of a biting sensation in the eyes after the instillation of a sublimate solution, and in my experiments hyperæmia of the conjunctiva was produced a number of times. I am therefore inclined to think, in spite of what Franke[1] has recently said on this point, that such solutions are more or less irritating in their effect on the conjunctiva. The most that can be said in favor of the use of such a solution is that it may actually kill some of the more superficial bacteria, and may perhaps deprive others of some of their virulence, in other words, render them less pathogenic. It is more than probable that many of the conjunctival bacteria are so firmly attached or embedded in the conjunctiva as to be beyond the reach of either the aseptic or of the antiseptic method as practised by ophthalmologists, and nothing but the most vigorous scrubbing would produce asepsis. This is certainly the case with skin bacteria, as has been demonstrated by the experiments of Robb and Ghriskey.

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[1] *The Johns Hopkins Hospital Reports*, vol. iii., p. 359.

[2] *The Johns Hopkins Hospital Bulletin*, vol. ii., p. 50, April, 1891.

[3] "Étude sur l'Antisepsie Oculaire," *Ann. d'Oculistique*, T. cxi., p. 433.

Krönig and Menge[2] have shown that the vagina possesses a natural immunity from infection, and that this natural immunity or natural resisting power is invariably impaired by antiseptic irrigations. I believe that some such safeguard surrounds the conjunctiva, and that this membrane possesses in its cells and fluids anti-bacterial properties calculated to withstand successfully infection, or else it would be impossible to explain the relative freedom from disaster after operations upon the eye, especially after those which were performed in the days when no precautions were taken to avoid infection. The experiments reported here show that so far as the conjunctiva is concerned, little reliance can be placed upon the usual methods employed by ophthalmologists for obtaining asepsis.

In the clinic, which after all is the supreme court where these questions are finally adjusted, we are every day getting proof which points to the existence in every part of the body of a natural power of resistance to, or recuperation from, the action of pathogenic bacteria, and I think that ophthalmologists can bear witness to the fact that the eye must possess this quality in a high degree. This being the case it is clear that these natural powers should not be weakened, and that we should avoid the use of agents which irritate and which may diminish the natural resisting powers of the tissues. The objections which have been rightly and widely urged against the antiseptic method as applied to the eye hold good in a measure for the aseptic method.

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[1] *Graefe's Arch. für Ophthal.*, Bd. xliii.

[2] *Deutsch. med. Wochenschr.*, N. 43, 45, 48.

To abandon our attempts to disinfect the conjunctiva may seem a step backward, and there are not a few no doubt who attribute some of their success in cataract operations to having flooded the conjunctival sac with sublimate solutions. The fact that pathogenic bacteria are occasionally found in the normal conjunctiva is not a strange thing when we consider how often this class of bacteria is found in exposed parts of the body, which are clinically speaking normal. And why is it that the conjunctiva remains normal though it may contain pathogenic organisms? In a measure because the organisms are usually present in small number, and because it is not likely that they remain long in the normal conjunctiva. It has been shown that when large quantities of pyogenic bacteria are introduced into the normal vagina, they disappear from this locality in a few hours, and it is likely that the conditions in the normal conjunctiva are in a similar manner adverse to the prolonged survival of this family of organisms. But let the integrity of the conjunctiva be lowered (as for instance by an irritant), or, in other words, let the balance of power be disturbed in favor of the bacteria, and at once they break through and destroy.

We handicap the eye in its fight with the enemy whenever we make the corneal section, and we try to compensate for this disadvantage by employing a germicide. Now sublimate stands high as a germicide, but, unfortunately, on account of its irritating qualities it cannot be used in the eye except in a very weak form, and when so diluted it has been clearly shown to have lost much of its germicidal value, especially under conditions present in or on the animal body, and, furthermore, to have not been deprived entirely of its irritating properties. The fact that a successful operator has made it a habit to irrigate the conjunctiva with a sublimate solution whenever operating upon the eyeball does not in the least indicate that the sublimate contributed to success. Evidence is constantly multiplying to show that sublimate is an ineffectual germicide in the living body in the form in which we use it in the conjunctiva, and all that the successful operator can say is that the sublimate apparently did no harm. Even in pre-antiseptic times cataract operations were usually successful, and this cannot be attributed entirely to the skill of the operator. The increased success which we have enjoyed since the advent of antiseptic surgery through Lister must be traced, not to our having actually succeeded in disinfecting the conjunctiva, but rather to a right understanding of all that the principles of antiseptic or aseptic technique mean as applied to operations upon the eye, namely, sterile cocaine, sterile atropine, sterile hands, and, the greatest of all, sterile instruments.

Conclusions.—(1) The normal conjunctiva always contains bacteria. Of these the staphylococcus epidermidis albus is found with such frequency that it must be regarded as a regular inhabitant of this situation. This coccus and probably other bacteria found in this locality are usually of only slight if any pathogenic power. It should be remembered, though, that bacteria, ordinarily non-pathogenic, may become harmful under certain favoring conditions, such as the bruising of the tissues by instruments or the irritation resulting from chemical substances.

(2) Neither the irrigation with sterilized water nor the instillation of a sublimate solution (1 : 5000) produces sterility of the conjunctiva, and inasmuch as both measures are futile and possibly harmful they may just as well be abandoned. These methods of sterilizing the conjunctiva are the ones usually employed by ophthalmologists, and hence the choice of them for testing this question.

The most important essential of a germicide which is to be used upon the conjunctiva is that it be absolutely free of irritating properties, and, furthermore, it should be demonstrable that this germicide will destroy the germs most commonly met with in the normal conjunctiva. It goes without saying that an antiseptic which has these qualities would be indispensable in all operations on the eye.

(3) In operating upon the normal conjunctiva, as in cataract operations, the surgeon in the present state of our disinfecting armamentarium would do well to consider the subject of antisepsis and asepsis chiefly, if not solely, in connection with the hands, instruments, cocaine, and atropine.

A FURTHER CASE OF ANGIOID STRIÆ IN THE FUNDUS.

By JOHN DUNN, M.D., Richmond, Va.

(*With two figures on colored Plate XIV. of Vol. XXXIV. Germ. Ed.*)

Drawings by John W. Brodnax, M.D., Manchester, Va.

Mrs. P., aged thirty-two, seen first April 22d, 1896. In October, 1895, patient had, according to her physician, iritis, of which no traces remain. No specific history obtainable, nor does the physician, who has attended her for many years, think she has ever had syphilis. Urine normal. She had, however, received treatment for rheumatism. About the first of March, 1896, patient noticed that, when reading, a cloud would "come before" her eyes. V, April 22d, O. D. = $\frac{20}{100}$; with + 1 D sph. = $\frac{16}{80}$. O. S. V = $\frac{20}{80}$. No improvement with glasses. No pain about the eyes. Conjunctiva, cornea, iris, ciliary region, lens, vitreous, and field of vision normal. Eyes are abnormally sensitive to light, requiring the use of dark glasses. Examination of the fundus reveals a condition of the retina new to me. The blood-vessels, save some dilatation of the veins, O. D. and O. S., are normal; so is to all appearances the retina except for the areas to be described. The optic disc shows perhaps some paleness. The outlines of the discs are not sharply defined. Extending from the margin of the disc, O. D. and O. S., are streaks, as shown in the cuts, of varying widths and lengths. The outlines of these streaks are more or less well marked but irregular. They have their greatest width, as a rule, next the disc, while at their extremities they appear very narrow and resemble at first glance rents in the retina. These streaks pass everywhere beneath the retinal vessels, which they cross in such a manner as to prove that they have no connection with the vessels. In several places, for varying lengths, the streaks at first glance appear to be the seat of hemorrhages; careful focussing, however, shows the red color to be the choroidal vessels passing beneath these areas—e. g., O, O′, O″, O. D. In the neighborhood of the disc these streaks anastomose to a greater or less extent. In two places, *a*, O. S., and *b*, O. D., the appearances presented suggest the idea that at these places the inflammation was severe enough to pass beyond the straight track and to cause slight hemorrhages. In two other places, *x*, O. D., and *x*, O. S., there are isolated patches resembling in color and appearance the streaks.

The color of the streaks is a light gray or leaden, save where the retinal pigment has been sufficiently destroyed for the underlying choroidal vessels to show through. In O. S., external to the macula, exists an irregularly circular area, about 2 o. d. in area, where the retinal pigment has been disturbed and gives the appearance sometimes seen in cases of commotio retinæ. The patient was put upon syphilitic treatment to which pilocarpine was added.

May 18*th*. V. O. D. = $\frac{16}{50}$. O. S. $\frac{20}{80}$.

June 8*th*. V. O. D. = $\frac{16}{23}$. O. S. $\frac{16}{23}$.

There have, however, been no visible changes in the appearances seen in the fundus. Marked diminution of the retinal hyperæsthesia.

May, 1897. Eyes as they were in June. No further addition to the streaks.

In considering the appearances above described mention must be made of the case reported by PLANGE (ARCH. OF OPHTH., vol. xxi., p. 282); of the articles by KNAPP (ARCH. OF OPHTH., vol. xxi.); by STEVENSON (*Trans. of Ophth. Soc. of United Kingdom*, vol. xii., p. 140, 1892); by HOLDEN (ARCH. OF OPHTH., vol. xxiv., p. 147); by WALSER (ARCH. OF OPHTH., vol. xxv., p. 363); by FRETORI (*Deutschmann's Beiträge z. Aughk.*, No. 24, p. 101); and, lastly, those by DE SCHWEINITZ (*Amer. Ophth. Soc. Trans.*, 1896) and (*Oph. Record*, July, 1897). Plange's explanation is that these appearances are to be referred to a "deposition of pigment in striæ in the retina after hemorrhage, followed by changes—probably hyperplastic—in the supporting fibres of Müller." Knapp strongly insists upon the hemorrhagic origin of these striæ. That this is undoubtedly true is later clearly proven by the case reported by De Schweinitz. There are several points to be noted in the case given above. In the first place, where these streaks and the retinal vessels cross each other, the vessel, in every instance, lies above the streak, and is nowhere surrounded by an exudate. The streaks do not follow the lines of the vessels, but cross them in every direction ; furthermore, they take their origin from the edge of the disc, whence they travel towards the periphery. Entirely surrounding both discs is an irregular band, in color and appearance identical with the streaks, and it is from this band that the striations all proceed. In several places about the disc they anastomose, as do also, in one or two places, the projections from the main streaks. That these appearances are inflammatory in origin is without question, it would seem ; the proof is afforded by the changes seen at *k.*, O. S. ; by the isolated gray patches seen at *x*, *x*, O. D. and O. S. ; and by the presence of the slight hemorrhages seen along the borders of the areas *a*, O. S., and *b*, O. D. It is further to be noted that in color these striations are neither brown, dark brown, black, nor white, but are of an almost uniform gray or lead color. There are nowhere to be seen the " glistening stripes " mentioned by Plange, nor has there, as yet, developed any " whitish fringe." The picture presented by the fundus in April, 1896, is practically unchanged in May, 1897, showing how slowly visible changes occur after the absorption of the hemorrhages. De Schweinitz's case, seen in the stage where the hemorrhages are still visible, and watched for more than a year, proves that these angioid streaks follow retinal hemorrhages. The variations in number, in width, in position, and color of these streaks depend upon the extent of the hemorrhages, their duration, and the general condition of the patient. As to why the result of retinal hemorrhages should be the formation of these peculiar streaks, aptly called angioid, we can offer no better explanation than that given by Knapp, namely, that " after a hemorrhage the blood corpuscles lie more or less loose in the retina, and are by the tissue currents collected in lines or irregular figures, such as we see in the sand at the seashore " (*Trans. Am. Ophth. Soc.*, 1896, p. 660). De Schweinitz's case shows that the shapes of the original hemorrhages correspond, in some instances, very closely to the subsequently developed streaks.

KERATITIS VARIOLOSA.

By Dr. C. E. FINLAY of Havana, Cuba.

DURING the severe smallpox epidemic which was so alarmingly prevalent here, in Havana, last autumn and winter, I had the opportunity of observing several of the ocular complications of this loathsome disease. By far the most common was a keratitis distinguished by certain characteristics in its appearance and in its course, of which I saw twenty-four cases. As I would never have formed a correct idea of the affection from the descriptions which I have found in the text-books and monographs—both older and more recent—that I have been able to consult, I venture to submit my observations to the ophthalmological public, hoping that they may prove interesting and to some even useful.

The usual time for the appearance of this complication is between the end of the second and the end of the third week of the disease, after desiccation has commenced; occasionally it occurs earlier, at times not till after convalescence is fully established. At this, its earliest stage, one finds at a point in the cornea, somewhere between its centre and the margin, an irregularly square-shaped patch, from 1 to 2 *mm* square (even when involving the centre of the cornea its situation is apt to be ex-centric). The appearance of this patch is most striking and characteristic. The greater part of its area is transparent, though distinctly differentiated from the remainder of the cornea by oblique illumination with accurate focusing, and gives one the impression of a more or less large drop of fluid contained in the substance of the cornea. The edge nearest the corneal margin, however, stands out prominently, showing a deep milky-white infiltration. The epithelium over all this area is intact. At this stage one also finds moderate ciliary injection and marked photophobia, blepharospasm, and lachrymation.

Most gradually the marginal infiltration extends over the remainder of the patch till the whole presents a uniform milky-white or yellowish color; occasionally, however, the edges show a deep infiltration throughout the whole course. Whilst this is going on, a partial or total desquamation of the epithelium covering the infiltrated area takes place. Ciliary injection is of course more marked. During this period the subjective symptoms also become more prominent, the blepharospasm, photophobia, and lachrymation are more intense; ciliary neuralgia, especially at night, is the source of much suffering and discomfort; the severity of these symptoms is usually in proportion to that of the local lesion. Seldom is there any accompanying iritis. Hypopyon at times is present; it was so in six of my twenty-four cases; in none did spontaneous perforation occur. I saw, however, a case of panophthalmitis with corneal sloughing which, from the history, seems to have originated in a keratitis of this nature which had been grossly neglected.

After lasting for a longer or shorter time, the objective and subjective symptoms slowly commence to recede, the infiltrated area gradually becoming vascularized. This vascularization in its turn diminishes, and finally a more or less dense leucoma results; the consequent interference with vision depending on its position, size, and density. It clears up somewhat during the succeeding months. The blepharospasm and photophobia persist for a long time, diminishing gradually in intensity.

The *duration* of the disease seems interminable; the cases drag on for a long time after convalescence is fully established, and are a sore trial for the patience of both patients and oculists; few last less than three or four months.

The *prognosis* as regards the integrity of the eyeball is good; in none of my cases was the eye lost. The remaining deficiency in vision depends on the leucoma, and may be corrigible at a later period by an iridectomy, if not too extensive.

Treatment seems to have little or no influence on the duration of the affection. The one I followed was mostly palliative and directed towards avoiding complications. It consisted mainly in cold or hot boric acid compresses, frequently renewed, and in frequent instillations of bichloride of mercury (1 : 6000) and atropine (½ per cent.) drops. Where there was much blepharospasm and photophobia I used yellow ointment, often continued, with cocaine. During the vascularization stage I derived some benefit from the dusting in of calomel. The ciliary neuralgia I controlled with antipyrin and phenacetin. I several times cauterized (with a red-hot probe) the infiltrated margin or even the whole patch (where not too large), but never obtained the slightest benefit, either as regards the intensity of the symptoms or as regards the duration of the affection, from the operation. In two cases with hypopyon where suppuration of the globe seemed imminent, and in which I made a Saemisch section, this was averted, and the duration of the inflammation as compared with other cases was notably shortened; but in one with no hypopyon where I performed a similar operation, this had no appreciable influence on the subsequent course. In two other cases with hypopyon I opened an abscess of the cornea with a Graefe knife without going through the cornea,[1] letting out a puriform exudate contained in its substance, with beneficial results as regards the hypopyon. In these two cases the posterior layers of the cornea were found perfectly transparent (perforation afterwards was spontaneously completed). Two other hypopyon cases got well without operative interference, in one suppuration of the globe appeared to threaten, and the operation on being proposed was refused by the patient.

As regards the *nature* of the affection, it is very difficult to form a correct opinion, not having had an opportunity of examining any of these eyes anatomically. The stage of the disease at which it makes its appearance seems to preclude the lesion being considered as a variolous pustule and would incline one towards a secondary infection direct or metastatic. On the other hand, the impression made on me was decidedly that of a vesicle contained in the substance of the cornea, the contents of which at first being transparent gradually became opaque, and if not evacuated became more and more inspissated, finally organizing into more or less dense cicatricial connective tissue. The long course of the affection also seems to go hand in hand with that of the skin pox-marks which remain discolored for so many subsequent months. I am rather inclined to consider the lesion as a variolous pustule which in the cornea, for some reason or other, appears at a later period than in other tissues.

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[1] The first time this occurred accidentally ; I had intended making a Saemisch when a sudden movement on the part of the patient's head made the knife cut through the superficial layers of the cornea without going through it, thus laying the abscess open.

PARTIAL EMBOLISM OF THE CENTRAL ARTERY OF THE RETINA.

By C. F. CLARK, M.D., of Columbus, O.

As is well known, the first instance in which a correct diagnosis of embolism of the central artery of the retina was made by the use of the ophthalmoscope was the classical case seen by that pioneer in modern ophthalmology, A. Von Gräfe, in 1858, and described by Schweigger a few years later.

While there is a general agreement among ophthalmologists as to the phenomena of complete embolic obstruction of the central artery, the relatively rare instances in which a portion of the retina has retained its vascular supply and continued to perform its functions have been the subject of some differences of opinion among careful observers, and this fact would seem to warrant us in bringing to the attention of the profession such cases as may come within the range of our experience.

Case I.—**Embolism of the central retinal artery, with preservation of the papillo-macular area.**

On January 12, 1896, I was consulted by Mrs. C. E., age fifty-one, who was referred to me by her physician, Dr. Barcroft, of Coshocton, Ohio, on account of the condition of her left eye. She had known of no defect in her vision until nine days before the above date, when suddenly, while sweeping, she noticed what she described as a "glimmering" before the left eye and in a few moments the whole visual field clouded over with the exception of a small space near the centre.

Although not robust, her general health had been good with the exception of one severe attack of malarial fever from which she suffered some twenty years before, and occasional mild attacks of the same disease in the spring and fall. She knew of no cause to which she could attribute the disease of the eye.

Her vision was R E $\frac{6}{7}$ — L E $\frac{6}{30}$ — seen only within a limited area near the disc, and with this eye she could, by the aid of a + 4 D sph. glass, read with difficulty Jaeger 9. The pupillary reaction could not be determined as she had used atropine a few days before. In the right eye the visual field was apparently normal, while in the *left it was irregularly elliptical and extended only from the blind spot to the point of fixation.* At a distance of one foot it measured in its vertical diameter two inches and horizontally three inches.

On examination with the ophthalmoscope it was found that the field of vision corresponded to the papillo-macular area which was normal in color in the midst of a whitish, œdematous zone surrounding the disc. The macula, while not like that of typical, complete embolism of the central artery, presented a marked contrast to the surrounding pale retina, and formed the apex of an irregularly triangular island of normal tissue, the base of which was formed in part by the disc. The upper and lower borders of the triangle were formed by vessels, the lower of which seemed to be a vein while the character of the upper one was difficult to determine, though it was probably of the same nature. Both this upper vessel and a smaller one which extended some distance into the centre of the normal area appeared to emerge from the disc at some distance from the central vessels and they could therefore be said to have their origin possibly behind the situation of the embolus. *A superficial hemorrhage* of considerable size was observed near the margin of the disc about the upper vessel above mentioned and a small one on the vessel supplying the central portion of the triangle. The larger veins of the retina, especially the inferior, were somewhat distended while the arteries were all quite narrow.

No vessel of the so-called "cilio-retinal" variety could be made out and, indeed, there was ample nutrition supplied to the normal area by other vessels without resorting to the assumption of the existence of such a supply.

CASE II.—**Embolism of central retinal artery, with preservation of the papillo-macular area.**

Mrs. J. W. M., age thirty-four, was referred to me by Dr. Buckingham of Springfield, Ohio, on August 18, 1896, with the following history :

While walking on the street in the evening of the 15th, three days before her visit to me, she had a fall which, however, seemed to her of no significance, as she caught herself with her hands and did not strike her head, but on awaking the next morning she found that the vision in her left eye was very defective and the field greatly limited. No cause other than the fall could be discovered as her general health had been good.

A physical examination by Dr. Rogers revealed a *slight*, *soft*, *diastolic murmur* along the left side of the sternum, heard with maximum intensity in the fourth intercostal space four inches from the median line and as far to the left as the axilla.

The general appearance of the eyes was normal, the pupils responded to light, and there was no discomfort excepting that caused by the defective vision and limited field of the left eye.

The vision of the right eye was $\frac{5}{5}$ and she read J 1 at 5″ — 14″. In the left the vision was $\frac{5}{12}$, and the field, which was difficult to measure, seemed to take the form of an *irregular*, *acute-angled triangle*, the apex of which was at a somewhat eccentric point of imperfect fixation, the centre corresponding approximately to the normal point of fixation, and the base to the temporal side. Outside of this area there was absolute blindness. The portion of retina therefore which retained imperfect vision extended in the form of an irregular triangle from a point near enough to the macula to give vision of $\frac{5}{12}$, to the disc and beyond it in a somewhat irregular zone into the nasal quadrant.

This corresponded approximately with what was seen with the ophthalmoscope, namely, that while there was slight, general œdema of the retina, an irregular, horizontal zone, including the disc and extending toward both the nasal and temporal sides and increasing in width both to the right and left of the disc, was fairly clear. Two vessels, apparently of somewhat deep origin, extended from the disc near its centre to the inferior temporal quadrant of the retina, the upper one of which seemed to pass just beneath the macula and formed a rather sharp outline to the grayish œdema which was to be seen in the lower portion and to a less degree in the upper portion of the retina. A small, well defined, independent vessel of deep origin could also be seen on the opposite side of the disc extending into the nasal quadrant.

The patient continued to enjoy vision of $\frac{5}{12}$ with the same visual field for more than three months, when her baby accidentally struck her in the left eye with a child's bow which, without causing pain or other evidence of traumatism, instantly deprived her of this power and produced a long, narrow, cloudy scotoma in what had been the best portion of her narrow, triangular visual field.

On April 16th, 1897, when I saw her last, she could with difficulty count fingers at a distance of one or two feet when held so that the image should fall in the nasal portion of the limited field.

The patient, who is an intelligent observer of her own symptoms, drew a diagram to indicate the form of the scotoma which made its appearance after her recent injury, and it corresponds to what might be expected were an embolus to find lodgement or a thrombus to be formed in the small macular artery mentioned above.

CASE III.—**Embolism of superior branch of central retinal artery.**

On August 1, 1893, I was consulted by Mr. A. D. S., a botanist, thirty-three years of age, of good habits and good general health, who gave me the following history:

While camping he awoke on the morning of the day before his visit to me with the sensation of a veil over the right eye, and with vision defective in the lower portion of the field. He thought the visual field had increased since the accident, but while a rough test revealed a normal outline for the left eye, in the right there was blindness below a horizontal line through, or a little above, the centre of the field.

He stated that for three or four weeks he had been somewhat indisposed, complaining of pain in the chest. About sixteen months before he had grippe, followed by rheumatism, which did not, however, assume the acute inflammatory form. At one time, while suffering from grippe, he fainted and fell from his chair. As the result of a physical examination made by Dr. Rankin,' it was determined that he had a slight cardiac murmur due to roughening, which was the result of endocarditis, and, as there was a tendency to recurrence of the rheumatic symptoms, he received appropriate treatment.

Vision and field in the left eye were normal. In the right eye the lower half of the visual field was defective, but the superior half was normal, as was also his central vision when tested at a distance. But on attempting to read he was hindered somewhat by the limitation of the visual field, which made it difficult for him to find quickly the line beneath the one upon which his attention had been fixed.

The general appearance of the eyes was normal, and he complained of no pain.

The ophthalmoscopic appearance of the left eye was normal, but in the right was seen a most striking picture. The lower half of the retina presented the usual appearance, while the upper half was white and œdematous. The lower border of this area of œdema was clearly defined, and it extended farther to the temporal than to the nasal side. Above, it did not seem to extend to the extreme periphery.

The arteries were a little smaller than usual, and at the point of bifurcation above and near the disc there was a slight interruption of the light streak which should be seen in the centre of the artery.

The most important, and to me the most interesting, feature of the case was a short, slightly crescentic, red line lying above the apparently normal but well defined macula. This short crescent had its convexity upward, was approximately concentric with the macula, and seemed to correspond with, and, in fact, to be the upper segment of, the cherry-red spot seen in cases of embolism of the main trunk of the central artery. In other words, the sharply defined lower border of the œdematous area of the retina passed through the upper portion of the macula, and therefore it was only at this point that the contrast was noticeable.

On August 4th, three days later, the patient detected some improvement in his vision in the defective portion of the field. The superior and superior temporal portions of the disc still seemed slightly swollen. The region of the macula was more evenly red, and the concentric red spot above had disappeared. The outlines of the defective portion of the field of vision corresponded to those of the œdematous portion of the retina as seen with the ophthalmoscope.

On August 12th the superior portion of the retina had assumed a more pinkish tint, but was still far from normal, and there was no improvement in the visual field.

On October 5th, sixty-six days after the appearance of the embolism, Dr. Rankin reported that a few days before Mr. S. had an attack of dizziness, which he described as peculiar and not at all like that of ordinary vertigo, and his wife stated that he was for a few moments absolutely blind in the right eye. He told Dr. Rankin that, on turning his head to one side, he had a tendency to continue to turn it.

Notwithstanding the above symptoms and marked anæmia, he persisted in continuing his work in spite of my remonstrances.

On October 13th, he stated that the lower portion of letters seemed slightly indistinct, which is in keeping with the fact that the upper portion of the macula was affected, but this indistinctness was not sufficient to prevent him from having vision of $\frac{4}{4}$ in each eye improved by the correction of his hypermetropia and low degree of astigmatism to $\frac{4}{3}$, nor from reading Jæger 1.

The ophthalmoscope revealed some pallor of the optic disc, with slight indistinctness of outline at the upper border, indicating possibly very slight swelling. The superior retinal artery was somewhat diminished in size, and the light streak in its centre was very narrow, indicating marked diminution in its calibre.

The dense white of the superior half of the retina was at that time replaced by an almost imperceptible blush of opacity slightly masking the normal pink beneath it.

The field of vision had improved, and objects could be seen at a point 15° to 20° below the line of central vision.

In June, 1894, I found that the central vision had remained good, and that there had been decided improvement in the visual field. The light sense was imperfect, but present in the defective portion of the retina.

On the 18th of July, 1896, about three years after the embolism first made its appearance, a careful examination of this patient by Dr. Rogers still revealed normal central vision with a pale disc.

It seemed that there was atrophy of the superior fibres of the retina and of the nerve fibres of the upper portion of the disc. The vessels in the superior portion of the retina were small, and the retinal tissue was dull in appearance. In the upper portion of the visual field his vision was good. In a broad zone below the centre it was dull, while the lower portion was practically blind.

Whether or not in this case the preservation of vision in the macular region was due to the existence of a cilio-retinal vessel, is a question which might naturally arise, but I detected no such vessel, and Dr. Rogers assures me that in his recent examination he satisfied himself that none existed. Had there been such a supply, I do not think the œdema would have followed in so direct a line across the upper half of the macular region.

It is probable that there *never* was *complete* obstruction of the superior temporal artery, but the obstruction was sufficient to produce the sharply outlined area of œdema, which confined itself to the field of distribution of that vessel. In the macular area, however, the anastomosis of the smaller vessels with those of the inferior branch of the central artery was so complete as to preserve all, excepting its upper quadrant, from the temporary disturbance of function produced by the œdema. Had the obstruction ever involved the whole calibre of the artery, it is not probable that, on the one hand, the vision in the superior half of the retina would have been almost completely preserved, or, on the other, that the macula would have continued to perform its function so perfectly, even at the time when the œdema was most marked.

The fact that the œdema, which in the days immediately after the occurrence of embolism is usually found to correspond in a general way in its area of distribution with the area which remains blind, is merely an incident, and does not stand in a causative relation with the permanent blindness is, I think, demonstrated by this case. It will be remembered that this œdema did not extend to the periphery in the superior portion of the retina, while an examination at a later period revealed blindness of the extreme lower portion of the visual field, and the ophthalmoscope discovered evidences of atrophy of the retinal tissue of the corresponding region.

The lower portion of the upper half of the retina, on the other hand, which was the seat of the most marked œdema, recovered almost perfect vision.

One would conclude from this that, whatever may be the temporary effects on vision produced by œdema of the retina, the permanent effects in a case of embolism are produced by impairment of the nutrition of the nerve-fibre layer. If this occurs for only a limited period of time, as by cutting off the vascular supply, the nerve fibres do not seem to have power to recover their functional activity.

While the case I have just described is, so far as I can learn, unique in the fact that in it we had a crescentic or partial, cherry-red spot in the macular region, Cases 1 and 2 are of more real interest as belonging to a group which for a number of years has attracted the attention of ophthalmologists owing to the belief on the part of many that, by means of what are termed "cilio-retinal" vessels, the papillo-macular region obtains a blood supply which is independent of the central retinal artery.

If the crozier-like vessels, which in many individuals are seen to emerge apparently from the temporal border of the optic disc at such a depth in the nerve tissue as to suggest their origin in the choroid and then curve upward and outward to be distributed to the papillo-macular portion of the retina, really belong to the choroidal system, and are not branches of the central retinal artery, we certainly should be able, with the evidence afforded by the microscope and the ophthalmoscope in the number of cases of embolism of the central retinal artery which have been recorded, to demonstrate that fact. And, if they are merely branches of the central artery which, having their origin at some depth in the nerve head, pass outward to its temporal sheath at a point behind the lamina cribrosa, and are then reflected toward its centre as they emerge, and thus take the form which gives the impression that they come from the choroid, we should also be able to demonstrate that fact. That the question is one of great importance is apparent when we consider the comparative frequency of the occurrence of such vessels, and the distinctive form which they assume.

De Schweinitz (*Diseases of the Eye*, ed. 1896, p. 113) states that "in a series of examinations Land and Barrett found this vessel present in 16.7, Veasey in 14.2, and the author [De Schweinitz] in 10.6 per cent." (It is possible that these observers may have included as "cilio-retinal" vessels all vessels of considerable size emerging from the disc at its temporal margin and distributed to the papillo-macular region.)

Dr. W. K. Rogers and the writer have for a few months made notes on this point in all ophthalmoscopic examinations. We distinguished between a vessel appearing near the margin of the disc and turning directly into the retina and one which had its apparent origin beneath the scleral ring and, after being directed toward the centre, curved again toward the periphery. This latter, crozier-like vessel we classed as a "cilio-retinal" vessel, and in the examination of 310 eyes Dr. Rogers found it present in 8 per cent., while the writer, in 317 eyes, found it in 10 per cent. (Had all the independent vessels of deep origin been included, Dr. Rogers's percentage would have been 27.3, and the writer's 22.3.)

What anatomical proof have we that the so-called "cilio-retinal" vessels originate in the choroidal system?

In a somewhat extended search of the literature of the subject I have been able to find but one instance, that of Birnbacher (ARCHIVES OF OPHTHALMOLOGY, vol. xvi., p. 32), in which the claim that an anatomical examination has demonstrated the presence of such a vessel is supported by what appears to be strong evidence. A plate which accompanies the description of this case would certainly seem to make clear that in this instance at least such a vessel did have its origin in the choroid.[1] This was not, however, a case of embolism.

The ingenuity of the theory by which the occurrence of such an anastomosing or independent vascular branch from the choroidal system explains the preservation of the papillo-macular area of the retina when an embolism has obstructed the central artery seems to have had a peculiar charm for all who have written on the subject, and has led many observers to accept it without criticism, and whether or not such an anomalous vessel can be proven in any instance to have co-existed with the preservation of normal vision in this area, it is certain that in many instances writers who are generally careful observers have fallen into the error of adopting this explanation where the evidence is entirely insufficient.

Professor Laqueur (October, 1896, ARCH. OF OPH., vol. xxv., p. 525) gives abstracts of sixteen cases of embolism of the central artery with integrity of the temporal region of the retina which he states are all he could find recorded.

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[1] A similar drawing by Alt occurs in his *Histology.*—W. A. H.

In addition to these the editor of these ARCHIVES mentions three other cases which should be added, and I have found two more mentioned in medical journals, which seem to have been omitted. These, with the case described by Laqueur, and the two which I have described above, make a total of twenty-four.

In the literature at my command I have been able to obtain somewhat detailed accounts of sixteen of these twenty-four cases, and it may be pertinent to ask how far the results of a careful study of these clinical cases warrant us in concluding that true cilio-retinal vessels were the means of preserving the integrity of the papillo-macular region of the retina.

In answer to this question it may be interesting and, in view of the claims that have been repeatedly made in favor of this theory, it is certainly surprising, to note that in not one instance has the existence of what has been classed as a cilio-retinal vessel been demonstrated ophthalmoscopically. In not one was anatomical evidence adduced to prove that such a vessel was present, and while only four writers claimed the existence of a cilio-retinal vessel, three of these in the context made it apparent that they did not distinguish between a "cilio-retinal" vessel and a macular vessel of deep origin.

In conclusion I would say that beneath the statement of the time-honored theory that in embolism of the central artery a so-called cilio-retinal vessel serves to preserve the papillo-macular area by virtue of its origin in the choroidal system, we must write *not proven.*

A CLINICAL AND ANATOMICAL CONTRIBUTION TO THE SIMPLE OR SEROUS CYSTS OF THE CONJUNCTIVA.

By GIACOMO ROMBOLETTI, Pavia.

Translated by Dr. J. A. Spalding, Portland, Me.

(*With Plate I. from Vol. XXXI.*, *German Edition.*)

EVERY contribution to this chapter of ophthalmological pathology, which is still small owing to the few cases observed and described, must be of interest, because the pathology of these structures, even in the latest text-book (Panas), has had but little light thrown upon it. Without intending to offer a detailed classification of conjunctival cysts, but simply to show the histology of a case of simple cyst observed in our clinic, I may divide these structures into four different sorts.

The *first* class of cysts embraces those which lie in the bulbar conjunctiva, and are largely congenital, though they occasionally develop as the patient grows. Saemisch[1] says that they often lie near the corneal margin, that their walls are delicate and thin, with scattered vessels, and with clear, watery contents. Generally they are not movable, from which we may conclude that the conjunctiva itself takes part in the formation of their walls. Amongst other writers, Wecker[2] speaks of a thick-walled cyst which is immovable, owing to its adhesions to the sclera, whilst Mackenzie[3] mentions those which are movable beneath the conjunctiva, showing no adhesions with the latter or with the sclera.

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[1] *Graefe-Saemisch*, ix., pt. 1, p. 157.

[2] *Traité complet*, t. i., p. 425.

[3] French translation, 1855, t. i., p. 363.

The histology of this first sort of cyst is still unexplained, and Panas urges that they ought to be regarded as dermoid cysts rather than conjunctival, because of their thick walls and deep adhesions with the episcleral tissue.

The *second* sort of cysts is generally situated in the bulbar conjunctiva, shows the same morphology as the first species, and is chiefly of traumatic origin. The cases of this sort so far reported are not very numerous, and as chief amongst them we may refer to those observed by Uhthoff.[1] The first case which this observer saw was after an advancement of the rectus externus in a case of excessive convergent strabismus. Five weeks after the operation the patient observed a blister-like elevation 3 to 4 *mm* in height, at the insertion of the rectus externus, and about 4 *mm* from the corneal margin. The contents were purely serous and as clear as water. Anatomical examination showed the walls to consist of rather coarse fibrous connective tissue without any regular arrangement or stratification of the layers. The inner surface of the cyst was covered with a regular nucleated pavement-epithelium in one layer only. There was no foreign body, such as an eyelash, in the walls of the cyst or anywhere to be found in its contents.

Uhthoff's second case was due to a penetrating wound of the upper lid and ciliary region. Five weeks after, the unhealed cicatrix was closely examined, and on everting the upper eyelid two eyelashes were seen adherent in the incision. About 1 *cm* from the corneal limbus was a cyst the size of a bean, with the conjunctiva firmly adherent above it. The contents were serous and transparent, and on using focal illumination three eyelashes were seen to be imbedded in the walls of the cyst. During the operation for removal, the posterior wall of the cyst was found to be adherent to the sclera, and measuring 9 *mm* by 5 *mm*.

In all, five eyelashes were found imbedded in the walls, but only two with any degree of tenacity, the other three being loose and falling out during the manipulations. Of the two firm eyelashes, one lay imbedded its whole length in the wall, whilst the other was half imbedded and half free, like the stem of a pear. The insertion of the lashes in the cyst was marked with a minute papular prominence.

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[1] *Berlin. klin. Wochensch.*, 1878, No. 49, p. 729.

The author's examination showed a cystic wall of fibrous, nucleated connective tissue, but without any special structure or arrangement. The inside of the wall was lined with nucleated pavement-epithelium in one layer. The spot where the eyelash was inserted like a stem was proliferated into five or six layers.

The third cyst was discovered by the patient not long after an insect had flown into the eye. This cyst was elongated into a fine point at both ends and swollen in the middle. The anatomical investigation seemed to demonstrate a partially dilated lymphatic vessel in which, owing to the expansion of the walls, the characteristic structure of the vessel was lost.

Uhthoff, in his remarks about these cysts, emphasizes the brief duration of growth after the original injury, at the most only five weeks, and as the cyst was then large enough to be felt by the patient, its origin must be referred to as early a date as two weeks after the injury. In the third case the cyst had probably been present for some time, but was not observed by the patient until his attention was called to the eye by the slight injury from some insect.

The pathology of the second case proves clearly enough that the eyelashes were the exciting element. It is also possible that the hair follicle carried into the conjunctiva was the real cause of the origin of the cyst, as Rothmund has urged in the origin of pearl tumors of the iris.

Although structures composed only of epithelial cells may thus originate, we are not justified, according to Uhthoff, in transferring this mode of development to cysts with serous contents and connective-tissue walls. For, in pathological anatomy, there is no analogous occurrence, since, wherever such cysts have originated, they have always been retention cysts. Here there was nothing of the sort. The greatest probability is, that it was not the hair follicle implanted with the eyelashes themselves, but the latter alone, which acted as foreign bodies, produced inflammatory exudation in the surrounding tissues, and so gave rise to a cyst.

So far as the diagnosis is concerned, Uhthoff suggests that ordinary observation shows in most cases whether a conjunctival cyst has arisen from the dilatation of a lymphatic vessel or otherwise. Cysts which are due to partial dilatation of lymphatics lie, owing to their anatomical situation, in the superficial layers of the conjunctiva, are always movable upon the sclera, and we can generally follow from the end of the cysts the lymphatic vessel a little farther onward in the shape of a thin string. Traumatic cysts generally lie in the subconjunctival tissue, and owing to their deeper localization, and especially owing to the inflammatory reaction in their neighborhood, they are firmly attached to the sclera and to the overlying layer of conjunctiva, and consequently are but slightly movable over the latter tissue.

The *third* species of cysts includes those which generally develop on the bulbar conjunctiva as a result of the enlargement of the lymphatics of the mucosa, and, consequently, form a lymph-angioma of the conjunctiva. They are small, resembling rows of pearls or transparent worms, and lie on the surface of the mucosa.

These cysts were carefully investigated by Hirschberg,[1] and Panas, after remarking that they developed on the normal as well as on the inflamed conjunctiva, says that many authors regard them as lymphectasias. Delacoeillerie[2] reports nine cases showing that the cyst cavities were circumscribed, and might anastomose with one another, that they are subconjunctival, and that their lamellar connective-tissue walls are lined with an endothelial layer.

Finally, the *fourth* sort of cysts is a special one of its own, developing in the conjunctival fornix of the upper lid, but it has never been much mentioned except by Rampoldi and Bull, as cited in Panas's recent hand-book on diseases of the eye.

Recent histological reports by De Vincentiis[3] and his scholars[4] show that this fourth species of cyst originates solely in an enlargement of Krause's glands, and Antonelli gives the following brief résumé of all that is so far known of this class:

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[1] *Klin. Beobachtungen*, Berlin, 1874.

[2] *Thèse de Paris*, 1892.

[3] Italian Ophthalmological Congress, Naples, 1888.

[4] Moauro, *Clinica Oculista di Napoli*, 1887; Antonelli, *Annali di Ottalmologia*, 1890.

"They are congenital, or more frequently acquired in childhood or adult age. The reason for the enlargement of Krause's glands is not always the same. The direct cause, however, is a blocking up of the secretion of these glands—at one time by alterations in structure, narrowing or even closing the lumen of the efferent ducts; at another time by neighboring tumors, which mechanically obstruct the passage of the contents of the gland, and finally modifications of the secretions themselves in sort or in amount. The clinical picture is that of a blister imbedded in the upper (rarely in the lower) fornix, whilst the skin of the eyelids is protruded along the entire length of the enlarged gland."

On everting the upper lid, the blister looks as if it were imbedded between the eyeball and the eyelid; it is more or less tense and transparent, with clear or brownish contents, and the overlying conjunctiva is slightly hyperæmic, particularly where the cyst has attained a certain size.

Having thus hastily reviewed the subject of conjunctival cysts as a whole, I now offer the history and anatomical examination of a recent case of my own.

C. A., æt. twelve, was first seen in the Milan Hospital, in November, 1893. He had been treated four years before for a perforating wound of the cornea and sclera, with prolapse of the iris and ciliary body. The incision ran between the insertion of the superior and internal recti. The injury terminated in phthisis of the eyeball. Up to November, 1892, he had no trouble with the eye, but about that date he observed the development of a small translucent body, like a blister, at the seat of the original injury, and which gradually enlarged. In April of the following year the tumor had increased greatly in size, almost encircling the cornea, and projecting between the eyelids very noticeably. There was, however, no pain in or about the eye or orbit, and the patient only consulted us on account of the excessive deformity produced by the enlargement, whatever its nature might be.

Ordinary observation shows a bulging forward, between the lids, of the entire fold of lower bulbar conjunctiva, just as if there were well marked chemosis of the conjunctiva producing eversion of the lower lid. The summit of the elevation is pale pink in color, gelatinous in appearance, and with a mother-of-pearl-like reflex. The surface is covered with several tortuous blood-vessels, well set off against the anæmic background of the mucosa, the transparence of which causes one to think of hydrops of the conjunctiva. On separating the eyelids the prominence is seen to follow exactly the line corresponding to the fornix of the lower conjunctival sac. At the inner canthus the growth arises close to the caruncula lachrymalis, in correspondence with the plica semilunaris. The tumor, whatever its nature may be, lies obliquely to the surface of the sclera, and reaches its maximum thickness (about 2½ *cm*) just below the lower margin of the cornea. Approaching this region the conjunctiva covering the tumor rapidly flattens out, so that the tumor appears to cease where the conjunctiva passes over into the superficial layers of the cornea.

The tumor as a whole is, as it were, divided into a lower horizontal portion, which corresponds to the lower margin of the cornea and above into two vertical horns, as one might call them, directed toward the inner and outer commissures. The cornea is cicatricially contracted and shapeless. On the sclera, between the insertions of the rectus superior and rectus internus and about 2 *mm* from the limbus, and directly over the inner horn of the tumor, we see a small, circular, grayish-black spot, as big as a hemp seed, and just below where the conjunctiva begins to elevate itself into this horn we see a black dot corresponding to the incarceration of the ciliary body. Lateral illumination shows nothing more of any consequence. Tension normal, and vision totally abolished.

In deciding upon the diagnosis of this case, our first idea was of hydrops. But even supposing that there was a collection of this nature beneath the conjunctiva, we had no right to think of an effusion such as we often meet with as a complication of inflammatory processes of the conjunctiva, that is to say, any ordinary chemosis, because there was no inflammatory reaction in the membranes of the eye over the eyelid.

On the contrary, there was much in favor of the idea of the presence of a serous effusion, such as only occurs with primary affections. The excellent health of the patient, the limitation of the affection to a circumscribed portion of the conjunctiva, and the history, inclined us to believe in the presence of a spontaneous œdema, as often seen in convalescence from exhausting diseases (heart and kidney affections).

And then, after all, the last opinion was that we had to do with a neoplasm of the conjunctiva, and that neoplasm a cyst.

It is well known that some authors refer cysts of the bulbar conjunctiva near the corneal margin to injuries, and such an origin seemed possible here. Nevertheless we recalled how Saemisch says,[1] "that in marginal corneal fistulæ we often see a circumscribed roundish elevation of the mucosa at the corneal margin and having certain resemblance to a cyst of the conjunctiva, but differing from this in that it extends beyond the corneal margin. Moreover, wounds or incisions close to the corneal margin, and imperfectly healing with incarceration of the iris or development of a yielding cicatrix, may give rise, in the development of a cystoid scar, to alterations which bear great resemblance to a conjunctival cyst, but which, owing to their locality and to other possible alterations in the eyeball, should never deceive anyone as to their correct interpretation."

So, too, Wecker[2] remarks that there seems to be much confusion between fistulæ of the cornea, cystoid scar, and actual cysts of the conjunctiva.

These suggestions led us to think also of the possibility of an extensive cicatrix in the cornea and sclera with incarceration of the ciliary body, and that this was the starting-point of a filtration process of the intraocular fluids into the meshwork of the connective tissues which had thus collected beneath the conjunctiva without being at all a genuine cyst.

Finally, in this stage of doubt we decided that the only accurate way to establish our diagnosis was to remove a portion of the growth and examine it microscopically. But first with a syringe the contents of the tumor were removed, whereupon the entire mass collapsed. A Graefe's knife was then employed and a large piece of the anterior wall removed. Three small bits were then taken from various portions of this anterior wall, embracing the entire thickness of the conjunctiva.

After this excision, and eversion of the remaining conjunctival portions of the cyst wall, the sclera lay bare before us. We could then see that if this tumor were a cyst, it was neither adherent to the sclerotic nor to the episcleral tissue, upon which, by the way, nothing was to be seen that could incline us to believe that there had been any serous accumulation of intraocular fluids. And thus we could prove that the opened cavity of the prominence had no connection with the previously described incarceration of the ciliary body in the incision of the former injury of the globe.

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[1] *Graefe-Saemisch*, Band iv., Heft 1, p. 150.

[2] *Traité complet*, t. i., p. 424.

The incision that we had made in the conjunctiva was now sutured, but we soon saw that we had forgotten to examine whether or not the bulging conjunctiva consisted of one or of two layers, one corresponding with the upper surface of the mucosa, the deep one with the sclera, which could thus have formed the walls of a cystic cavity in the subconjunctival tissue whence the liquid above mentioned had been drawn. But, in point of fact, the histological examination made at a later date confirmed this supposition.

Microscopic examination of the liquid showed leucocytes, some swollen and hydropsic, some almost destroyed, others pigmented with black granular pigment within the protoplasm, endothelial cells like those in the vascular walls and in the lymph spaces, some flattened and lamellar; a few epithelial cells, some round, others right-angled with distinctly visible nucleus and finely granular protoplasm, and, finally, protoplasmic products of destruction of the white blood corpuscles.

The histological examination showed that the portion excised was formed from the conjunctival mucosa, with all the characteristics of that portion which covers the eye near the limbus of the cornea (Fig. 1, *a*, *a*, *a*, with many layers of the epithelium). The multiple layers contained numerous cells with alterations resembling those of mucous degeneration, and distinguished from other similar cells by their behavior toward the various staining materials employed; those with alum-carmine showing an intense color, those tinted with picro-carmine appearing on the whole almost colorless. The aspect of the whole reminds us of that of the goblet cells of the intestinal mucous membrane, for, like those, they have a round or oval swollen body filled with mucus, and a narrow basal portion in which we can distinguish the nucleus deeply stained, of an irregular form, and, as it were, pressed flat by thinned-out cellular contents. The underlying connective tissue (Fig, 1, *b*, *b*) shows nothing abnormal except slight hypertrophy and the associated engorged vessels. The meshes of the connective tissue contain the infiltration of lymphoid elements peculiar to the conjunctival mucosa, but no lymph follicles. Only in the deeper layers does the submucous connective tissue show a specific arrangement. It is thicker, the infiltration less, its fibres regular, mostly united in longitudinal bundles and lying over one another in regular strata, as in all those connective-tissue structures which form the stroma of the cystic epithelium (Fig. 1, *d*, *d*). But what more characteristically formed the connection between the histological examination and the clinical diagnosis was the circumstance that directly to this tissue is attached a pavement epithelium with but few layers and interspersed with a few flattened elements (Fig. 1, *e*, *e*, and Fig. 2).

This histological condition confirmed the anatomical diagnosis of our case. There was no doubt that this growth represented a serous cyst of the conjunctiva from which we had unfortunately not excised portions of both walls, but merely a portion of the superficial wall and one corresponding to the conjunctiva in which evidently the cyst had developed, whilst the other and deeper wall corresponding to the sclera was lost during the excision or disappeared after the excision had been made. I should be inclined to think that, on the whole, there was no possible connection between the cyst and the injury several years before. In Uhthoff's case the cyst followed an injury, but directly afterwards, whilst in my case three years had elapsed after the injury before there were any signs of development of the cyst. Furthermore, our cyst did not show any of the signs which Uhthoff regards as characteristic of cysts of traumatic origin. In point of fact there were neither adhesions with the sclera nor eyelashes nor foreign bodies to be found in the walls or in the contents. Although the patient thought that the cyst first started from the locality of the original injury, we must not forget how little credit is ever to be given to what patients say, and more than this the examination proved that the tumor followed exactly the lower fornix of the conjunctival sac.

After all these considerations we must refer the origin of the cyst to the lower half of the eyeball, and in the last line *to cystic degeneration of Krause's glands.* Although it is true that the amount of material was so small in quantity that it could hardly exhibit all of the characteristics of such an origin with absolute certainty (small daughter-cysts, emissary glands, enlargement of the cavity in connection with the mother-cyst), yet the histological marks of the cyst wall, and particularly those which appertain to its enveloping epithelium, were sufficient to establish the identity with Krause's glands. For cysts which owe their origin to an enlargement of such a gland exhibit the same epithelium, the numerous layers of which in our sections additionally prove that our cyst originated from the enlargement of an emissary tubule and not from a glandular acinus, for in the latter case the epithelium would have had but one layer.

Antonelli urges that cysts of the conjunctiva originating from Krause's glands can only be observed in the upper conjunctival fornix, because at that region they are very frequent (from 8 to 20), and often in a space of 20 *mm* lie crowded together, whilst the lower fornix contains hardly more than from 2 to 8, and those quite widely separated. He also cites as support for this argument the fact that he finds but one case of cystic enlargement of Krause's glands in the lower fornix on record, and that one was not anatomically demonstrated. In reply to this, I can only say that our cyst was anatomically demonstrated as a cyst originating from a Krause's gland in the lower fornix, and that it is hard to understand why such pathological processes should not develop or why a cyst should not originate from similar glands in that region, even if they are but few in number and widely scattered.

For all these reasons I feel justified in drawing the following conclusions:

(1) The origin of this cyst is to be referred to an enlargement of an emissary duct of one of Krause's glands of the lower fornix of the conjunctiva, in agreement with the pathogeny established by De Vincentiis. The impulse thereto may have been given by the original injury.

(2) The differential diagnosis between a genuine serous conjunctival cyst and a serous accumulation in the meshwork of the conjunctival tissues, preceded by filtration through a cystoid cicatrix, is not always easy to establish

clinically, but, on the contrary, often demands an accurate anatomical proof.

Explanation of the Figures.

FIG. 1.—(Zeiss, AA oc. 2) *a*, *a*, *a*, Conjunctival surface with enveloping epithelium.

b, *b*, *b*, Underlying hypertrophic conjunctival connective tissue.

c, Enlarged blood-vessel.

d, *d*, *d*, Underlying conjunctival connective tissue with specific arrangement, which forms the supporting stroma of the cyst epithelium.

e, *e*, *e*, Enveloping epithelium of the cyst wall.

FIG. 2.—(Zeiss, D.D. oc. 2) *b*, *b*, epithelium of the cyst wall much enlarged.

EXPERIMENTAL STUDIES ON THE EXTENSION OF FLUIDS INJECTED BENEATH THE CONJUNCTIVA.

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(*With Plate II. of Vol. XXXI.*, *German Edition.*)

THE favorable action of subconjunctivally injected fluids, such as weak sublimate or salt solutions, on the resorption of pathological products in the eye, excited in us the idea that such injections produced increased lymphatic circulation in the eye [1] in the sense of the lymph-exciting remedy of Heidenhain.[2] And the first question naturally to arise was the extension of fluids injected beneath the conjunctiva. For many authors, and amongst others Motais,[3] have asserted that fluids thus injected remain *limited to the anterior portion* of the eyeball, and that for this reason he preferred to inject all remedies into Tenon's capsule.

In order to answer these questions fully, we made use of white rabbits exclusively, and employed as injecting material emulsions of India ink. Previous to the experiments, the eyes were all carefully examined, externally, as well as with the ophthalmoscope, and only rabbits with absolutely normal eyes employed.

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[1] Mellinger: "Clinical and Experimental Investigations on Subconjunctival Injections and their Therapeutical Importance." These ARCHIVES, vol. xxix, Germ. ed. Marti: "Ueber Subconjunctivale Kochsalzinjectionen." *Inaug. Dissert.*, Basle, 1894.

[2] "Versuche und Fragen zur Lehre von der Lymphbildung." *Pflueger's Archiv*, Band xlix., 1, 1891.

[3] *Société française d'Ophtalmologie*, 1891.

The emulsion was made with distilled water, sterilized, moreover, by boiling, and the subconjunctival injections made with a sterilized Pravaz syringe. The canula was invariably inserted parallel with the corneal margin, and never in a meridional direction. The injection was always made very slowly, never with more than half a syringeful, and additionally, the syringe and needle, as the last step before the injection, were dipped in absolute alcohol.

After subconjunctival injection of the India-ink emulsion, the eye remains perfectly free from irritation, provided that the emulsion had been sterilized before using. Four or five hours later the ink can be plainly seen not only at the place of injection, but extending everywhere beneath the bulbar conjunctiva. On the following day, the entire region around and about the eye, especially all over the upper lid and toward the bridge of the nose, is tinted an intense black. Even more astonishing is the appearance of the iris, for that which in healthy albino rabbits appears of a pinkish red, is now of a dirty gray, and gives one the impression of a pigmented iris. We can even perceive in the folds of the iris, running parallel to the pupillary margin, still darker stripes of pigmentation than the radiating stripes. An examination with Westien's magnifying lens shows a discoloration still more intense than that perceived by the naked eye, but actual clumps of pigment are not definable. We may here remark, that this discoloration cannot be regarded as any sort of a reflex from the very black conjunctiva.

The ophthalmoscopic examination finds the media of the eye perfectly clear and transparent, but both below and above the optic papilla we see peculiarly dark curved marks as shown in Figure 1. These marks invariably appear in this shape in every rabbit's eye, but we have never been able to distinguish them at the *sides of the optic papilla.* The lower, and the rather darker figure of the two, lies close to the papilla, and seems to follow its margin like a black elevated ridge. A vessel coursing toward it is enormously dilated with blood, and is much more prominent than the associated vessel in the uninjected eye. It then turns as it approaches the black mark, follows for a short distance the black inky wall, and finally disappears. Above the ridge we can see some fine choroidal vessels.

Above, and at some little distance from the papillary margin, we see a large semilunar figure, with its concavity directed toward the upper margin of the papilla. This too is also very intensely tinted, and over it course the much injected choroidal vessels. Farther in the periphery we see here and there in the fundus, but without any special arrangement and shining through the choroidal vessels, small dark spots as big as the head of a pin, as shown in Fig. 1, a little above the semilunar upper mark.

Numerous experiments with subconjunctival injections always verified the alterations as just described, and a number of similarly treated rabbits still remain under observation. As an example of our experiments I will here cite our notes on the examination and microscopy of a rabbit's eye.

A white adult rabbit with normal eyes in all respects. The right eye is carefully cocainized, and half of a thoroughly sterilized syringeful of moderately thick emulsion of India ink is injected beneath the conjunctiva, just above the cornea, with a carefully sterilized instrument. The immediate result is a thick black chemotic wall in the upper portion of the bulbar conjunctiva. On the following day the upper lid is swollen, and through the white hairs we can distinctly see the blackened skin of the eyelids. The localized chemosis of the conjunctiva has disappeared, but now the whole conjunctiva around the corneal margin is jet black, and the fold reflected back on the lower lid is also grayish. The iris, reddish-pink before the injection, is now of a streaked bluish-black, and shows fine black lines running parallel with the pupillary margin. The media are clear, and the ophthalmoscopic image resembles that shown in Fig. 1 as before described. On the following day some fine dark spots are seen in the periphery of the retina.

Within the next four weeks several injections were made, but no new appearances became visible in the fundus of the eye, though the new ones were more and more distinctly defined. Finally, the rabbit was killed, and the eye put into Mueller's fluid. After hardening, it was subjected to the usual treatment, and vertical sections made. Afterwards both halves were imbedded in celloidin.

If we examine sagittal sections of such a half of the eyeball with weak enlargement, we see that the ink has extended as shown in Fig. 2. Thick black threads of ink have passed from the limbus of the cornea both into the lids and into the posterior portion of the eye, and well along the optic nerve. The ink has passed along the muscle-sheaths and sclera into Tenon's capsule. When the optic nerve is reached the emulsion collects around it and spreads partly backward along the scleral sheath and partly into the connective tissue surrounding the nerve, both above and below.

Even this superficial examination with low powers shows how extensive a circuit, passing completely around the eyeball, India-ink emulsion makes when injected beneath the conjunctiva. Having thus shown what ordinary observation reveals, we will next describe the results of more careful examination, followed out section by section, and these we hope will partly explain the symptoms seen in the living injected rabbit's eye, and partly will give us further information concerning the action and therapeutics of similar subconjunctival injections in diseased eyes.

Conjunctiva.—Carefully following the path taken by the injection, we find various accumulations of the same at the limbus of the cornea, in the wide-meshed connective tissue beneath the epithelium, and farther, we see little cones of India ink penetrating into the sclera possibly for about one third of its entire thickness. At the limbus the nodules of ink are very closely aggregated, and near the spot of injection a smaller portion passes to the cornea and pushes forward a moderate distance directly beneath the corneal epithelium.

Cornea.—Examination with low powers of sagittal sections shows the lymph spaces resembling fine black threads. But with higher powers, or with the immersion lens, these threads are seen to be composed of fine granules of ink in substance. Meridional sections of the cornea reveal more easily these inky granules in the interior of the lymph spaces. Here we observe that the granules lie along the walls of the spaces, whilst the centres are open. The epithelium of the cornea shows a few leucocytes laden with ink granules, whilst a few of the same are also seen beneath the endothelium.

The *sclera* shows in the lymph spaces ink granules which increase in number in the spaces nearest the optic nerve. The greatest accumulation lies upon the sclera and can be followed along the ciliary nerves as far as their passage into the suprachoroidal space.

Muscles.—All of the muscles are not only infiltrated with ink in their connective-tissue sheaths, but it follows the connective tissue surrounding the muscular bundles, and assumes in this locality a globular formation. The tendons also are surrounded with ink granules.

The optic nerve shows a very large deposit of ink in the intercellular substance, and in the fatty tissue. The numerous heaps of ink here take the same globular form as first seen in the connective-tissue surrounding the muscular bundles. The microscopic image suggests a meshwork filled with black drops, some of which show a sharply defined contour.

Just *above* the entrance of the *optic nerve*, and therefore in correspondence with that portion of the globe into which the injection was made, the amount of ink is much greater than at any other spot. Here we see two black streams pass into Tenon's capsule, and on the sclera toward the optic nerve. The greater portion of the ink is found beneath the dural sheath, less in the arachnoidal space, and a small amount enters the nerve itself.

Beneath the optic nerve the quantity of ink is much less, but it still shows a distinctly black streak between Tenon's capsule and the sclera. At the place where the optic nerve bends the ink is spread out into a very delicate globular form and passes on to the sclerotic ring, decreasing in amount so as hardly to be discerned except with high magnifying powers.

The uveal tract including the ciliary body and the choroid contains only a few granules, but they require high magnifying power and a long investigation to perceive. They can be seen rather more easily in the choroid, not in the tissue, but mostly along the lines of connective tissue.

No trace of the ink granules can be discovered in the retina.

The microscopic examination gives remarkable results concerning the extension of subconjunctivally injected fluids, and at the same time explains some phenomena observed in the living eye after the injection of ink. First we see that the ink thus injected extends around the entire globe, and this thus explains the powerful action of different fluids injected beneath the conjunctiva. Our examination confirms the observation already made on the living, that aseptic ink solutions injected beneath the conjunctiva do not produce any inflammation. The fluid passes along the connective-tissue spaces by the muscles and into Tenon's space; in other words, along paths which the lymph current generally takes. At some spots we see connections with the inner lymph spaces of the eye; thus we see ink along the penetrating places of the ciliary nerves, as far as the suprachoroidal space, and in the dural sheath of the optic nerve. *But we must at the same time insist that the amount of ink actually entering the eyeball is small in comparison with the total injected.*

The curious discoloration of the iris after the injections cannot be explained by the presence of ink, because so little of the same is actually discovered in the tissues. Nor can we refer it to any conjunctival reflex. And we are finally driven to believe that the actual cause of this curious phenomenon is the darkening of the fundus produced by the black marks about the optic papilla. The proof for this is shown by injections of ink *into the vitreous*, whereupon the iris at once becomes exceedingly dark.

The circumpapillary figures are due to large amounts of ink collecting in that region, and shining through the sclera. Their absence from the sides of the papilla is due to the presence in rabbits of double-contoured nerve fibres laterally from the papilla. The small dark spots above the papilla correspond to the entrance of ciliary nerves surrounded with granules of ink.

If we investigate the literature of observations on subconjunctival injections, we find but little of value. Deutschmann, in his studies on the extension of sympathetic ophthalmia, made injections into Tenon's capsule, and found that they penetrated as far as the intravaginal space of the optic nerve. And Darier, at the Heidelberg Congress in 1893, in referring to these experiments, asserted that he had ophthalmoscopically discovered granules of ink in the fundus of the eye. In the discussion, Sattler remarked that he had observed the ink injection in the form of a ring around the papilla, and attributed the transportation of the granules to the posterior pole of the eye to leucocytes. But this our experiments do not confirm. For we fail to find any inflammation in eyes so treated, and consequently we find extremely few leucocytes. The main accumulation of ink lies, as Fig. 2 shows us, in thick black masses along the muscles and in Tenon's space, and then farther back around the optic nerve. All along this path the mass of ink consists of large black, thickly compressed granules, whilst leucocytes laden with fine granules are very rare indeed. Although this condition argues against Sattler's views, we believe that the following experiment with injections of Berlin blue in dead animals shows that we must not call on leucocytes in order to explain the circumbulbar extension of subconjunctivally injected India ink.

Sheep and rabbits were employed directly after death, with perfect sterilization. The Berlin blue was placed in a trough about 1 *cm* above the head, and a rubber tube so arranged as to let pass into the canula of a Pravaz syringe a drop of the solution at a time, so that there could be no question of force urging the fluid onward into any but a natural route. The canula was then placed beneath the conjunctiva, just as in the other experiments, and the solution permitted to make its way slowly into the subconjunctival tissues. Immediately there appears around the conjunctiva a dark-blue chemotic ring, which embraces the whole globe; in about half an hour the eye begins to project slowly from between the lids, and with the ophthalmoscope we see the same figures about the papilla as after the injections of ink. After enucleation, all of the eyes, no matter whether exposed from two to six hours to the fluid blue, exhibited an intense blue color which extended around the whole eye to the optic nerve.

The microscope shows the conjunctiva lifted off from the eyeball by the fluid, and thoroughly permeated with it. A small portion of the blue has passed toward the margin of the cornea, but the largest portion has extended backward beneath the conjunctiva, surrounding the muscles entering into Tenon's capsule, and passing between the latter and the sclera toward the optic nerve. Reaching here, it passes between the connective and the fatty tissue which surrounds the globe, and applies itself in a thick layer to the dural sheath. The side where the injection is not made shows the blue following the sclera in a thick stripe. No section shows that the interior of the eye has been reached.

These experiments verify the results made on the living eye, for the action of leucocytes in dead eyes is positively excluded. Therefore we can conclude with certainty that *subconjunctivally injected fluids, following the greater lymph spaces, surround the entire globe.*

So far as communication with the interior of the eye is concerned, our experiments confirm the views expressed by Deutschmann and other observers. *We are therefore inclined to believe that fluids injected beneath the conjunctiva not only surround the eye and the optic nerve, but additionally by paths of communication can communicate with the suprachoroidal and intervaginal spaces of the optic nerve.*

ABSTRACTS OF THE PAPERS IN VOLUME XXX. (1895) OF THE GERMAN EDITION OF THESE ARCHIVES NOT PREVIOUSLY TRANSLATED.

By Dr. WARD A. HOLDEN.

I.—A Contribution to the Etiology of the Congenital Malformations of the Eye.

By Drs. L. WEISS and W. OTTINGER.

Adolf B., æt. four, had, in the left eye, a coloboma of the iris downward and somewhat inward. The margins of the cleft converged toward the periphery and united before reaching the ciliary body, and the defect in the deeper layers of the iris was not so extensive as that in the superficial layers. There was no coloboma of the choroid. The disc was oval with a large dark conus to the nasal side, half as broad as the disc itself. The eye was highly hyperopic. The right eye was normal.

The interesting feature of the case is that the mother had a coloboma downward in her left eye, due to an iridectomy done for an injury in childhood. Of the four children, the oldest squints and has poor sight, the next two are healthy, and the fourth has the coloboma of the iris just described. At first glance one would be inclined to think this a case of inheritance of an ocular defect due to injury. If, however, such a general disposition existed, we should expect to find more cases of congenital malformation in the eyes of children whose parents' eyes have been injured or mutilated; yet such cases are very rare. As is well known, many observers like Weismann deny, not only the possibility of the transmission by inheritance of mutilations, but even the transmission of acquired characteristics. In opposition to this view, however, a series of observations has been published recently which indicate that mutilations may be transmitted.

Samelsohn made the following observation: A male rabbit had, in the right eye, an inoculation tuberculosis; in the left, experimental anophthalmus; the female had bilateral experimental ocular tuberculosis. Of three young, one had healthy eyes; two had, left, microphthalmus; right, nodules in the iris.

Deutschmann records the following: First generation of rabbits, the male had a scar in the iris following nodular formations brought about by the inoculation of tissue supposed to be tuberculous. In the fundus there were peculiar pigmentary changes. The albino female had traumatic cataract. Of six young, four had pigmentary changes in the fundus, one had phthisis bulbi with choroiditis disseminata and atrophy of both optic nerves. Second generation: the same male, the female having infiltration of the vitreous and retinal changes following an injection into the vitreous. Of the young, one was normal, one had, right, a dark brown iris; left, a light blue iris; right, pigment changes in the fundus; and one had a bilateral coloboma of the iris and choroid.

Perlia reports the following case: The mother in the early months of pregnancy had a severe inflammation of both eyes, leaving spots on the corneæ. The infant had, left, anophthalmus; right, coloboma of iris and choroid. The other children were healthy. The time of the mother's ocular affection corresponded to the period of development of the fœtal ocular cleft.

Richter speaks of a man who had lost his left eye from suppuration fifteen years before his marriage, and both of whose sons had microphthalmus on the left side.

Notwithstanding all these reports of hereditary transmission of defects, our case cannot be considered as belonging in this category. Two cases which will now be recorded are of a different sort, they being malformations in children whose parents suffered from ocular affections in pregnancy.

Mrs. B., æt. thirty-seven, has had six children, two of whom have congenital malformations of the eyes. The fifth was born totally blind, the left eye being absent, and the right having a coloboma of the iris. For eight months of this pregnancy the mother suffered from hemeralopia. The sixth child was examined at the age of seven, and was found to have an inferior coloboma of the iris and choroid in the left eye, this eye being smaller than the right. With corrected refraction V $= \frac{6}{12}$ in each eye. The disc in the left eye was vertically oval, and the pigment ring was open below, suggesting a coloboma. There was also a nasal conus. The coloboma of the choroid did not reach posteriorly to the disc. The mother was at that time suffering from hemeralopia and had a slight concentric contraction of the field with normal acuteness of vision and normal color perception. The fundus was dotted with little light spots apparently lying in the outer layers of the retina. No albuminuria.

Another interesting case is the following:

Rosa S., aged twenty weeks, was brought to be examined. In the right eye there was a coloboma of the iris in the usual downward and inward location, and also a coloboma of the choroid and of the optic nerve. On the left side there was anophthalmus and lower-lid cyst. The mother, during pregnancy, suffered from hemeralopia. At the time of examination her eyes were organically and functionally normal, and no cause for the hemeralopia could be discovered. In both these cases, however, the cause which produced hemeralopia in the mother in the course of her pregnancy seems also to have produced ocular malformations in the child, the left eye being affected when the malformation was monocular, and the left eye being more severely affected when the malformation was binocular, in accordance with the general experience that most congenital ocular malformations are found on the left side.

II.—ON SILVER-IMPREGNATION OF THE CORNEAL TISSUE.

By Dr. RUDOLF GRUBER,
Assistant to the First Eye Clinic at Vienna.

In order to obtain positive pictures of the corneal corpuscles in frogs, rabbits, and cats, I have employed the following method. The living cornea is bathed with a ten per cent. solution of hydrochloric acid until it becomes opaque.

The cornea then, without being washed, is rubbed over gently with a stick of nitrate of silver. It is then cut out and exposed to sunlight for one or two days, and a fine positive staining of the corneal corpuscles appears. The color of the ground substance is light brown, and that of the corpuscles dark brown. The branchings of the cell processes are more numerous than in negative pictures.

As is well known, His and Von Recklinghausen have obtained positive silver pictures by other methods. His laid the whole cornea or the sections, after treating them with silver, into salt solution or aqueous humor. Von Recklinghausen treated the cornea, after the silvering process, with very weak salt solution or dilute acids. I have obtained positive pictures in these ways, but never such fine ones as by my own method, which brings out the sharp contours of the cells and their delicate processes.

III.—ON INJURIES OF THE EYE. PART I: STATISTICAL.

BY DR. HILLEMANNS,

Assistant to the University Eye Clinic at Bonn.

In the Bonn clinic, between April 1, 1893, and April 1, 1894, 175 patients received hospital treatment for injuries of the eye. These were due to various agents, but principally to splinters of stone, iron, and wood, and to stalks of grain in the harvest field.

Among the women there were 10 cases of perforating injury, without peculiarities.

Among the men there were 44 cases of perforating injury: 26 of the cornea, 15 of both cornea and sclera, and 3 of the sclera alone. In about 33 per cent. of the cases the foreign body remained in the eye. The results as regards preservation of sight were bad, only 38 per cent. of the eyes preserving useful vision. Purulent infection developed in 11 of the 44 cases, and in 14 cases enucleation was required; sympathetic ophthalmia coming on but once, in a patient who refused enucleation when it was advised.

As to treatment, we never used scleral sutures, but bandaged the eyes, and kept the patient in bed. In severe inflammatory conditions hot applications were used. The external skin was cleansed, and the sac was washed out frequently with sterilized water, or with boric-acid solution when there was much discharge.

Serpent ulcer was seen 19 times in women, 8 times being complicated with blennorrhœa of the sac. When atropine and hot applications had no effect, operative procedures were employed, viz., cauterization once and keratotomy ten times. The latter operation was followed by most favorable results, and the average duration of clinical treatment was three to four weeks. Many of the younger women with serpent ulcer had no blennorrhœa of the sac, and these cases were milder and did not require operation.

Serpent ulcer was seen in men 38 times, 13 times being complicated with suppuration in the tear sac. Keratotomy was done in 15 cases, and cauterization in 2. In 7 of these cases vision from $\frac{12}{500}$ to $\frac{20}{70}$ was obtained. The average duration of treatment was somewhat longer than with the women.

The paper further contains detailed statistics as to the nature and results of the injuries, and as to the agents causing them; with a plea for the more frequent employment of the regular Saemisch operation in serpent ulcer.

IV.—THE FUNCTIONAL DISEASES OF THE ORA SERRATA AND THE CILIARY PORTION OF THE RETINA.

BY DR. W. SCHOEN, LEIPSIC.

It is difficult to say what are to be regarded as the normal anatomical relations of the ora serrata and the pars ciliaris retinæ, because pathological changes are so frequent that they have often been described in text-books as normal conditions. These functional changes of the anterior margin of the retina proper and of the epithelial cells composing the pars ciliaris retinæ are to be found in almost every eye whose accommodation is strained, since from these parts spring the zonula fibres.

Pars Ciliaris Retinæ.—In the normal eye the pars ciliaris retinæ is composed of regularly arranged cylindrical epithelial cells. The *mechanical* changes which this layer undergoes from traction are as follows: the cells are drawn out to a point, and they lose their regular arrangement. *Inflammatory* changes lead to signs of degeneration and proliferation. The underlying pigment epithelial cells also degenerate and give up their pigment, and with the destruction of the cells the zonula fibres also break down.

We may distinguish an acute, a masked, and a chronic functional inflammation of the pars ciliaris retinæ. The clinical picture is that commonly called simple cyclitis or iritis serosa in its different intensities. A great number of clinical histories of such cases are given in tabular form, in almost all of which the author found hyperopia or astigmatism sufficient to give rise to accommodative strain. Under the usual methods of treatment these cases last for weeks or months and are very prone to relapse. The author prescribes the proper glasses and uses a few drops of cocaine and atropine and the patients soon recover.

The Ora Serrata.—The author describes in detail the anatomical structure of the ora serrata. In its normal state, the retina ends in about 840 small tooth-shaped projections. This portion of the retina, like the pars ciliaris, is subject to mechanical changes from traction of the zonula fibres, and also to inflammatory changes. The mechanical changes consist in the development of larger spur-shaped projections. The inflammatory changes consist in proliferation and degeneration in and about these spurs, with accompanying changes in the choroid and pigment epithelium leading to the formation of visible patches.

This chorio-retinitis of the ora serrata always comes on with the other symptoms in eyes with strained accommodation, and appears in an acute or a chronic form, the former accompanied often with opacities of the vitreous, and scleritis.

The causes are hyperopia and astigmatism according to the rule. The results are: astigmatism against the rule, equatorial cataract, accommodative excavation, latent convergent strabismus, and chorio-retinitis oræ serratæ.

When the ora serrata is displaced forward, the zonula fibres slacken, the lens pushes the iris forward, and the width of the chamber angle is lessened. These changes, according to their extent, fall into four categories.

I. Normal position of iris and lens.

II. Ordinary accommodation, the outer half of the iris concave, the inner half convex, the anterior chamber shallower in the centre.

III. Pushing forward of the entire iris, more or less noticeable prolapse of the lens, convexity of the entire surface of the iris, shallowing of the entire anterior chamber.

IV. Apposition of the iris to the cornea, obliteration of the anterior chamber, absolute glaucoma.

The pressing forward of the lens leads to an increase in refraction, and the tilted position which it may assume leads to acquired astigmatism, usually against the rule. The author's cases of glaucoma have almost exclusively been in eyes with uncorrected hyperopia or astigmatism, and he believes that the correction of the refractive error would in many cases have prevented the development of glaucoma.

V.—THE OPERATIVE TREATMENT OF TRACHOMATOUS XEROPHTHALMUS.

BY DR. N. ANDOGSKY, ST. PETERSBURG.

In Russia 30 per cent. of the total blindness is due to trachoma, while in some districts the percentage is as high as 80. The pathological changes leading to loss of sight are mostly due to mechanical irritation, but another important disastrous change is xerophthalmus or dryness of the cornea and conjunctiva. This affection comes on in the cicatricial stage of trachoma when the mucous glands of the conjunctiva become atrophied. The entire extent of the conjunctiva may be involved. The lack of moisture causes the corneal epithelium to become cloudy under the drying action of the air. The xerophthalmus may reach such a grade that the surface of the cornea and conjunctiva has more the appearance of dirty cutis than of mucous membrane. In xerophthalmus another source of moisture may be wanting, viz., the tears, because the canals of the lachrymal glands may be obliterated, and even the glands destroyed.

At the present time, when the principles of transplantation of skin and mucous membrane, according to Reverdin, Wolfe, and Thiersch, are so well understood by ophthalmologists, the hope is awakened that xerophthalmus may be relieved by operative interference. I wish to speak here of a different sort of operative procedure which was suggested by Dr. Rudin, but which has been little practised, and is not described in print. This consists in shortening the palpebral fissure by sewing together the lids. Dr. Rudin performed this operation on the theory that in many cases of parenchymatous xerosis the atrophy does not involve all the mucous glands of the conjunctiva and all the ducts of the lachrymal gland, although there is not sufficient secretion to keep moist the entire surface of the cornea and conjunctiva that is exposed to the air; but that if the exposed surface was much reduced in extent it might be kept sufficiently moist to remain healthy. And on uniting the lids so that only a small portion of the cornea was exposed, it was found that the dried cells became macerated and were thrown off, the conjunctiva became more nearly normal, and the cloudy cornea cleared up.

I myself have done the operation five times. It begins with the Flarer operation, the margin of the lid being split, and a parallel incision in the skin of the lid 2–3 *mm* from the margin being made, the lashes being removed in the flap thus taken out in the entire length of the lids. In the centre of each lid, corresponding to the position of the cornea, the skin and mucosa are united by two sutures. The outer and inner portions of the two lids are brought together, the freshened edges of the upper and lower lid being united with four sutures, leaving a small opening about the lachrymal puncta, and an opening 5–6 *mm* long before the pupil. In two of the five cases the results, as regards improvement in sight and lessening of the discomfort, were favorable; in two others some improvement was noticed in the short time the patient could be kept under observation; and in one there was improvement only in the matter of the dryness.

VI.—ON FORMALDEHYD AS A PRESERVATIVE OF HUMAN EYES FOR OPERATIVE PRACTICE IN THE PHANTOM.

BY DR. N. ANDOGSKY, ST. PETERSBURG.

Eyes preserved in formol are well adapted for use in operative courses. They differ from the normal fresh eyes only in a greater hardness of the cornea that is felt in making the section, and in the fact that the punctured cornea does not collapse. In seizing the iris a toothed forceps is preferable on account of the hardening of the iris tissue, which smooth forceps do not readily grasp. The vitreous preserves nearly its normal consistence.

The following procedure can be recommended: Eyes with transparent corneas are placed in a 0.05–0.1 per cent. aqueous solution of formaldehyd, which is prepared by adding 5–10 drops of commercial 40 per cent. formalin to 200 *ccm* of water. After a half hour the liquid should be changed; the vessels containing it should be carefully covered, as it readily evaporates. Eyes may be left in this liquid as long as a week, but if it is desired to preserve them longer, they should be transferred to a thymol solution, 1:5000, in which they keep for several weeks.

(*To be continued.*)

REPORT OF THE THIRTY-THIRD ANNUAL MEETING OF THE AMERICAN OPHTHALMOLOGICAL SOCIETY.

HELD IN WASHINGTON ON MAY 5 AND 6, 1897.

By Dr. ARNOLD H. KNAPP, New York.

A general meeting of the Congress was held under the direction of this Society on Tuesday, May 4th.

The subject—**The gouty and rheumatic diatheses and their relation to diseases of the eye**—was treated under the following titles :

1. **Lesions in the retinal vessels, retina, and optic nerve, associated with gout,** by Dr. C. S. Bull of New York. Hemorrhagic retinitis is usually described as the common complication of gout. Gouty retinitis is like syphilitic retinitis. It may be accompanied by hemorrhages and opacities in the vitreous. Œdema of the retina is often the first sign. The changes seen by the ophthalmoscope are : changes in the vascular walls, a circumscribed retinitis occupying the posterior zone of the fundus, a yellow exudate with or without hemorrhages in the vitreous, and an optic neuritis with or without a retinitis. The central vision is affected, though total blindness is rare as the periphery usually escapes. In conclusion the author stated that : (1) the changes are bilateral though rarely symmetrical ; (2) the primary changes in the vascular walls are very minute ; (3) the angio-sclerosis and patches in the retina cause impaired central vision, the periphery being less affected ; (4) the central vision is progressively affected to a certain point ; (5) hemorrhages in the retina occur usually in the early stages of the disease ; (6) angio-sclerosis of the retinal vessels is the most marked feature ; (7) also a yellowish granular exudation in the retina is important,

—it is located at the posterior pole of the eye and does not invade the macula until late in the disease; (8) the changes in the optic nerve are generally intraocular.

2. Dr. S. O. Richey, of Washington, D. C., read a paper on **The relation of gout to glaucoma,** and traced the association of increased intraocular pressure to arterio-sclerosis and cardiac hypertrophy. The author criticised the various glaucoma theories and advanced his own well-known views on the latter subject.

3. **Cataract and its association with the gouty and rheumatic diatheses,** by Dr. S. D. Risley, of Philadelphia. The author drew attention to the fact that the gouty and rheumatic diatheses were the most frequent causes of chronic and subacute inflammations of the uveal tract, characterized by vascular changes in the choroid and opacities of the vitreous. This could readily account for the cataractous change as the nutrition of the lens suffers.

4. **Gouty and rheumatic affections of the uveal tract,** by Dr. R. Sattler, of Cincinnati. In the opinion of the author inflammation of the iris and choroid were more frequently caused in this country by the rheumatic diathesis than by gout. According to J. Hutchinson, the greater part of these affections were due to gout. Usually the early stages of gout show ocular complications. Diseases of the uveal tract due to gout show nothing distinctive in themselves. The results of operative interference in eyes with degenerative processes of gout are not favorable.

5. **Rheumatic and gouty affections involving the cornea, conjunctiva, and sclera,** by Dr. R. A. Reeves, of Toronto. Among the rheumatic and gouty affections of those parts of the eye, the author drew attention to (1) a form of keratitis of severe type, which usually receded in a few days; (2) a form where the cornea becomes opaque like porcelain; (3) the band-like opacities of the cornea; and (4) forms of episcleritis and scleritis.

The discussion was opened by Dr. J. M. Da Costa, of Philadelphia, who stated that in general medicine four-fifths of the chronic lesions called rheumatic were not rheumatic at all. He thought that the same might hold true in ophthalmology. Our knowledge of acute rheumatism and acute gout is somewhat more definite. He does not believe that there is such a disease as "rheumatic gout"; he prefers the term rheumatoid arthritis, and considers it an independent disease of neurotrophic origin. In general he has met with conjunctivitis, sometimes with iritis, in connection with acute rheumatism. In gout the eye complication has occurred during the acute attack or later, and usually one eye was involved after the other. Eye affections are very uncommon in rheumatoid arthritis. He has observed patients with lithæmic symptoms to show eye complications which usually began in the one and later involved the other eye, and were accompanied by headache.

In the regular session of the Society the first paper was on the

1. **Pathology of chronic pseudo-membranous conjunctivitis,** by Dr. L. Howe, of Buffalo. The author reported on two cases of this affection with presentation of one of the cases. The bacteriological examination showed the presence of a diplo-streptococcus in both, associated with the Loeffler bacillus in one, which resulted in the loss of the eye, while the other recovered. The author favors the classification of membranous conjunctivitis of Sourdille and Parinaud, which is the following: 1. Catarrhal; 2. Staphylococcus; 3. Streptococcus; 4. True diphtheria; but would add to the third group a diplo-streptococcus subdivision.

2. **Enucleation of both eyes owing to panophthalmitis in a case of exophthalmic goitre,** by Dr. J. A. Spalding, of Portland, Me. In a case of exophthalmic goitre, a process characterized by optic neuritis, then sloughing of the cornea and panophthalmitis attacked both eyes one after the other, and necessitated enucleation. The orbital tissue remained as a brawny, rigid, protruding mass for a long time. The author considers an inflammation of the orbital tissue to have been the beginning of the process.

3. **Exophthalmic goitre after ether,** by Dr. Aiken, of Savannah. During ether anæsthesia symptoms of exophthalmic goitre appeared in a patient, and persisted for six to seven years.

4. **Report of cases of pulsating exophthalmos,** by Dr. W. H. Wilder, of Chicago. The author reported on two cases of pulsating exophthalmos after trauma, and one of spontaneous origin. The literature of the subject, prognosis, and treatment were then reviewed.

5. **Double exophthalmos with destruction of eyes in an infant from a sarcoma starting probably from the**

dura near the sella turcica, with specimen, by Dr. S. M. BURNETT, of Washington, D. C. The author described a case of double exophthalmos in an infant, with paralysis of the sixth nerve, a swelling in the temporal region, loss of vision, ulceration of corneæ, followed by destruction of both eyes, and a fistulous tract at root of nose. At autopsy a tumor measuring 2½ by 2 by 1½ inches was found near the sella turcica; the neighboring bone, especially the orbital plates, were unevenly thickened; the ethmoid bone was completely destroyed. The tumor contained the optic and oculomotor nerves, and was a sarcoma.

6. **Diphtheritic conjunctivitis,** by Dr. MYLES STANDISH, of Boston. The author spoke of the advantages of early bacteriological examination and the antitoxin treatment. A severe and rapid corneal infiltration, even when conjunctival affection is slight, is always suspicious of a diphtheritic process. The secretion of every case of purulent conjunctivitis should be examined bacteriologically.

Discussed by Drs. DE SCHWEINITZ and WEEKS.

7. **Report on a new operation for prothesis in cases of cicatricial orbit,** by Dr. G. C. HARLAN, of Philadelphia. A lead wire is passed through the cicatricial bands round the bottom of the cavity, with the view of forming a sulcus. The wire is left in place for a number of weeks, and is then dissected out. The sulcus remains. A lead shell is worn at first, and is replaced by the artificial eye, which is borne without discomfort.

8. **A case of ivory exostosis of the orbit,** by Dr. W. F. NORRIS, of Philadelphia. The tumor of six years' growth arose from the os planum of the ethmoid bone, and pushed forward the internal palpebral ligament. It was successfully removed.

9. **Supplementary report of a case of ivory exostosis of the orbit,** by Dr. R. SATTLER, of Cincinnati. In the case previously reported upon by Dr. Sattler, a discharging tract persisted, and necessitated a reopening of the frontal sinus. Another exostosis was found in the outer part of the sinus extending up and back. This was removed. The specimen was exhibited.

10. **A unique intra-ocular tumor,** by Dr. E. JACKSON, of Philadelphia. In a previously sound eye the usual symptoms of a tumor led to enucleation. The tumor showed the histological character of cartilaginous tissue with only slight tendency to ossification.

11. **Angio-sarcoma of apparent retinal origin,** by Dr. W. B. JOHNSON, of Paterson, N. J.

12. **Two cases of pieces of steel in the eye, removal after localization with the X-rays,** by Dr. W. Thompson, of Philadelphia. In the first case the foreign body was in the crystalline lens. The X-ray was here valuable to determine whether the foreign body was of metal or of wood. The lens with the foreign body was successfully extracted after iridectomy. In the second case the foreign body was encapsulated in a dense connective band in the fundus. Its exact localization was made possible by a radiagraph with aid of a simple and ingenious localization arrangement, which was demonstrated by the author, Dr. Sweet, of Philadelphia.

13. **Value of repeated and differently placed exposures to the Roentgen ray in determining the location of foreign bodies in and about the eyeball,** by Dr. C. A. Oliver, of Philadelphia.

14. **Endothelioma of lower lid,** with specimen, by Dr. C. H. Williams, of Boston.

15. **Congenital ptosis and epicanthus,** by Dr. R. Sattler, of Cincinnati. In his cases the accessory levators, the occipitofrontalis muscle, were sufficiently developed to make operative interference unnecessary. With the epicanthus, inversion of lid and epiphora were associated, which were remedied by the exsection of a triangular piece of skin at the root of the nose. For ptosis the author prefers the advancement of the levator palpebræ tendon and the Panas operation.

16. **A new ptosis operation,** by Dr. W. H. Wilder, of Chicago. After an incision along the orbital margin, the suspensory ligament is shortened by two buried gathering sutures.

17. **Law of refraction—change following increase or decrease in body-weight,** by Dr. G. M. Gould, of Philadelphia. The author advances the supposition that the orbital fat changes proportionately with increase or decrease in body-weight and so, in case of increase of orbital fat, the eyeball is pressed upon, and the refraction becomes hypermetropic or less myopic, and conversely a diminution of fat results in an increase of axis and corresponding change in refraction.

18. **Bifocal glasses for cataract patients.** Dr. W. Thompson exhibited a pair of bifocal glasses, made by Borsch, where the refraction in the lower half of glasses was increased 2 D., by adding a segment of flint glass to the remaining crown glass. The resulting combination is also achromatic.

19. **Saccharine diabetes associated with changes in refraction,** by Dr. S. D. Risley, of Philadelphia. In a case of diabetes a decrease of the hypermetropia was noted with increase of amount of sugar in urine. No changes in the lens or vitreous could be observed, and the author inclines to the belief that there is a change in the density of the fluids which bathe the lens.

Discussed by Drs. Fridenberg and Wadsworth.

20. **A series of consecutive cataract operations,** by Dr. R. L. Randolph, of Baltimore. This is a careful report of a number of cataract extractions, some of which were performed under unfavorable surroundings. Among the complications may be mentioned two cases of maniacal excitement and one case where the anterior chamber remained open for seventeen days.

21. **Hemorrhages during or after cataract extraction,** by Dr. O. Wadsworth, of Boston. The author reported six cases of intraocular hemorrhages in association with the cataract operation where no cause could be found, where the behavior of the patients was good, and no suspicion was present before the operation.

22. **Cholesterine crystals in the opaque lens of a child,** by Dr. L. A. W. Alleman, of Brooklyn. In an infant of twenty months with congenital cataract, numerous immovable, glistening particles were found in the lens. Under the microscope the cholesterine crystals were visible.

A general discussion on cataract extraction followed. Methods of procedure and complications were freely discussed by Drs. Howe, Risley, St. John, Reeves, Webster, Theobald, Green, Weeks, Williams, Ray, Wadsworth, and others. Dr. Webster reported a case in which during the cataract extraction a large quantity of vitreous prolapsed. Three days later, on bandaging the eye, the retina was found prolapsed in the wound ; the eye was then enucleated. Dr. Howe exhibited a self-retaining fixation forceps. To procure *anæsthesia of the iris* injection of cocaine in the anterior chamber was advocated, also a subconjunctival injection of cocaine above line of incision.

23. **Taxis in intraocular tension,** by Dr. S. O. Richey of Washington. The author described the anatomical relations of the venæ vorticosæ and their bearing on the intraocular pressure and venous stasis according to his views of glaucoma, previously mentioned.

24. **Retinitis proliferans,** by Dr. J. E. Weeks, of New York. The author described a number of cases of retinitis proliferans,

two of which were illustrated with macroscopic specimens, and gave a review of the literature on the subject.

25. **A case of retinitis circinata,** by Dr. E. Fridenberg, of New York. Attention was drawn to the fact that the blood-vessels were not obscured by the patches, and to the presence of new-formed venous vessels, which was well shown in a drawing. The author emphasized the importance of distinguishing the relatively harmless character of this retinitis from the albuminuric form.

26. **Tobacco-amblyopia, with autopsy and microscopic examination of specimens,** by Dr. G. E. De Schweinitz, of Philadelphia. The author traced the atrophy of the papillo-macular bundle through the optic nerve, chiasm, and tract. The ganglion cells in the region of the macula showed no change whatever, so that this case does not support Nuel's views.

27. **Marked impairment of central vision following prolonged use of the affected eye,** by Dr. S. Theobald, of Baltimore. Eighteen days after calibrating a burette in the chemical laboratory, the patient became affected with a central exudative retinitis. Vision was reduced to $\frac{8}{200}$. The patient subsequently completely recovered.

28. **Hysterical or functional blindness,** by Dr. A. A. Hubbell, of Buffalo.

29. **A group of four cases of optic atrophy due to sexual excess,** by Dr. J. A. Spalding, of Portland, Me. Four young men became affected with optic-nerve atrophy. No cause could be found but sexual excess. There were no signs of tabes.

30. **A study of some of the ophthalmic changes in chlorosis, leucæmia, and leucocythæmia,** by Dr. C. A. Oliver, of Philadelphia. The author described some of the changes of the fundus, as seen with the ophthalmoscope in some of the diseases of the blood. The descriptions were illustrated by some beautiful ophthalmoscopic drawings.

31. Dr. J. O. Green, of St. Louis, reported on a case of **embolism of the central retinal artery,** where a small central patch of the retina remained preserved. The vision was $\frac{20}{70}$.

32. Dr. R. Murdoch, of Washington, exhibited and described Dr. Reid's **ophthalmometer.**

Dr. J. O. Green demonstrated a new electro-magnet for the eye ; Dr. C. H. Williams an apparatus for determining the axis of a cylindrical lens, and Dr. E. Jackson a modification of the binocular magnifying lenses.

A number of other papers were read by title.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE FOURTH QUARTER OF THE YEAR 1896.

By Dr. ST. BERNHEIMER, in Vienna ; Prof. C. HORSTMANN, in Berlin ; and Dr. P. SILEX, in Berlin ;

with the assistance of

Dr. S. M. Burnett, Washington ; Dr. Dantone, Rome ; Dr. Herrnheiser, Prague ; Prof. Hirschmann, Charkow ; Dr. P. von Mittelstädt, Metz ; Dr. Sulzer, Geneva ; Dr. L. Werner, Dublin ; Dr. C. H. A. Westhoff, Amsterdam ; Dr. Schiötz and Dr. Ole Bull, Christiania ; Dr. R. Greeff, Berlin ; Dr. Deus, Berlin ; Prof. Da Gama Pinto, Lisbon ; and others.

Translated by Dr. Ward A. Holden.

Sections I.–V. Reviewed by Dr. ST. BERNHEIMER.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS. STATISTICAL REPORTS.

498. Nettleship. Introductory address delivered before the Ophthalmological Society of the United Kingdom. *Transactions*, vol. xvi.

499. Transactions of the Ophth. Soc. Un. K. Vol. xvi., London. J. A. Churchill, 1896.

500. New York Ophthalmic and Aural Institute. 27th annual report, 1896. Dr. H. Knapp executive surgeon.

Nettleship's (498) address deals with influences of specialism and he thinks that the best results will be obtained when the staffs of special hospitals are composed of men who also hold office in a special department of a general hospital. He proceeds to suggest subjects for further study, amongst which may be mentioned: Sympathetic ophthalmia, without perforation; frequency of its occurrence from presence of a foreign body, and blanching of eyelashes in this disease; Detachment of choroid; Angioid streaks in retina; Amblyopia caused by alcohol in non-smokers; Intermittent paralysis of 3d nerve; Pemphigus; Membranous conjunctivitis; Disseminated choroiditis in young adults, of a map-like character, and probably not syphilitic, etc. WERNER.

This volume (499), which has appeared a couple of months later than usual, contains 368 pages with xiii. plates and 74 illustrations. Amongst the plates are two well marked cases of retinitis circinata, some micro-photographs showing the condition of the angle of the ant. ch. in conjunctival hydrophthalmos, and drawings showing the course of degenerated nerve fibres after division of portions of the retina. In addition to an index there is the usual list of communications tabulated under headings: Eyelids, Conjunctiva, etc. There are 64 communications, including the "Bowman Lecture" on vision and retinal perception by H. Snellen and an introductory address by the President, Mr. Nettleship. Abstracts of all the important and original papers will be found in these ARCHIVES. WERNER.

During the year ending Sept. 30, '96, the number of new eye patients treated at the N.Y. Ophthalmic and Aural Institute (500) was 8782. The number of major operations on the eye was 580, including 124 extractions of cataract with one failure. There were 88 uncomplicated extractions without iridectomy and 8 with iridectomy. The others were complicated in some form.

BURNETT.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

501. GALEZOWSKI. On the value of nystagmus in intoxication from chloroform or cocaine. *Rec. d'opht.*, 1896, p. 659.

502. VALUDE. Intoxication from the use of scopolamine. *Ann. d'ocul.*, cxvi., p. 380.

503. DUFOUR. Subconjunctival injections in ocular therapeutics. Lausanne. Bridel and Co., 1896.

504. GABRIELIDES. Note on a case of cyclopia in a pig-embryo. *Ann. d'ocul.*, cxvi., p. 374, and *Arch. d'opht.*, xvi., 10, p. 672.

505. SULZER. Some results of clinical ophthalmometry. *An. d'ocul.*, cxvi., p. 241.

506. KRÜCKMANN. Experimental investigations on the healing of scleral wounds. *Graefe's Archiv*, xlii., 4, p. 293.

507. BERNSTEIN A. S. Subconjunctival injections. *Jour. Amer. Med. Assoc.*, Sept. 12, 1895.

In two cases Galezowski (501) has seen the instillation of cocaine into the conjunctival sac followed by symptoms of intoxication as follows: horizontal nystagmus, symptoms of asphyctic excitation, trembling of the entire body, and fibrillar twitching of the fingers, jaws, and eyelids. In one of the patients, a boy of eleven, operated on for squint, the nystagmus continued for some time in the operated eye.

VALUDE'S (502) patient, a man of sixty-five, instilled a drop of a ½ % solution of hydrobromate of scopolamine into the eye in the morning. Some moments after repeating the instillation at 6 P.M., he was seized with loss of consciousness and delirium lasting twenty-four hours. SULZER.

DUFOUR (503) uses injections of bichloride 1 : 1000 or 1 : 2000 warmed to 40° C, which diminishes the pain. The eye is bandaged for two days, and he has seen no unpleasant effects, while therapeutically he considers these injections of great value and superior to those of salt solutions. SULZER.

The case of cyclopia in a pig-embryo, described by GABRIELIDES (504), is remarkable for the fact that while the combined eyes apparently represented a single eye only, the presence of a double lens left no doubt but that there had been a union of two separate eyes. SULZER.

SULZER (505) determined the astigmatism and the radius of corneal curvature in 1114 eyes. While he finds in general that myopia depends upon a lengthened axis, and not an altered corneal curvature, there are some cases in which the corneal refraction gradually increases. These cases are a transition form between the normal cornea and keratoconus. Such a case was followed for years, being repeatedly measured. Sulzer thinks that such cases may be recognized at the first examination by the following characteristics: the commencement of the trouble at an age of eight to twelve years; slight myopia with reduced acuteness of vision; irregularity of the surface of the cornea, with opalescence of the deeper layers on lateral illumination; slight spasm of accommodation. In general a high curvature of the cornea is more frequent in myopia than in emmetropia, and more frequent in the latter than in hyperopia. SULZER.

KRÜCKMANN (506) has studied the healing of scleral wounds in one hundred animals of five different species. The sclera was divided with a Graefe knife for a distance of 2–6 *mm.* He found that up to the end of the first day inflammatory processes were predominant, giving place on the second day to degenerative changes. On the third day the reparative process begins, and phagocytosis is noticeable, the new granulation cells taking up pigment and cellular debris. In favorable circumstances the wound may be fully closed by the third day, but usually four to seven days are required.

BERNSTEIN (507) has used cyanide of mercury (1 to 3000) subconjunctivally in seven cases and with much benefit in some instances, he thinks. The diseases were : hypopyon keratitis with ulceration, iritis, keratitis punctata, optic-nerve trouble, probably specific in its origin, tobacco-amblyopia, and choroiditis disseminata. BURNETT.

III.—INSTRUMENTS AND REMEDIES.

508. SIMI. On radiant heat in ocular therapy. *Boll. d'ocul.*, xviii., No. 10.

509. RAMPOLDI. Old and new ophthalmic observations. *Ann. di Ottalm.*, xxv., 6, p. 616.

510. CATTANES. The action of mydrol on the eye ; clinical experimental studies. *Ibid.*, xxv., 4, p. 361.

511. SIMI. Ophthalmia among the Auer operatives. *Boll. d'ocul.*, xviii., 11, p. 76.

512. SNELL. A short note on the value of the immediate use of hot water after enucleation of the eyeball. *Ophth. Rev.*, xv., p. 283. (Hot water a good hemostatic after enucleation.)

513. BULLER. The use of the electro-magnet in ophthalmic surgery, with some illustrative cases. *Annals of Ophth. and Otol.*, Oct., 1896.

514. RISLEY. Defective coquille glasses, a frequent cause of additional irritation to weak and inflamed eyes. *Am. Jour. of Ophth.*, Nov., 1896.

515. JENNINGS, J. E. Eucaine hydrochlorate, a new local anæsthetic. *Amer. Jour. of Ophth.*, Dec., 1896.

516. Jennings, J. E. An improved skiascope. *Ibid.*, Nov., 1896.

517. Hansell. Homatropine as a cycloplegic. *Ibid.*, Aug., 1896.

518. Jackson, Edward. Lenses for binocular examination of the eye by oblique illumination. *Annals of Ophth. and Otol.*, Oct., 1896.

519. Pinckard, C. P. A case of poisoning from scopolamine. *Ibid.*, Oct., 1896.

520. Rust, E. G. A new trachoma forceps. *N. Y. Med. Jour.*, Sept. 12, 1896.

521. Jackson, Edward. The value of homatropine in the diagnosis of ametropia. *Jour. Am. Med. Assoc.*, Nov. 31, 1896.

Simi (508), following Parent, experimented with radiant heat in its antiseptic effect on corneal infiltrations, with gratifying results. The tip of a Paquelin cautery point was covered with a pear-shaped non-conducting tip having an anterior opening in which was set a small lens of salt crystal, so that the eye was protected from lateral radiation. The cautery point was always held half a centimetre from the cornea. Dantone.

Rampoldi (509), refuting the claim of Secondi to priority in the use of subconjunctival injections of bichloride, states that he himself used iodide of potassium subconjunctivally in 1884, after Rothmund in 1866 made the first injections, using salt solution.

Dantone.

According to Cattanes (510) mydrol in 5–10% solution produces a moderate mydriasis lasting a few hours. The accommodation is scarcely affected, but it has a remarkable effect upon the blood-vessels, the bulbar conjunctiva becoming quite ischæmic for a time. The author believes, therefore, that the drug is useful as a mydriatic for ophthalmoscopic purposes and as an anæsthetic in affections of the conjunctiva, cornea, and iris, although less efficacious than cocaine. Dantone.

In order to protect the men manufacturing the Auer burner from the strong glow-lights and the emitted heat, Simi (511) had spectacles constucted each of a red and a green glass; but these soon became heated, and he only obtained the desired result by placing the two glasses a little distance apart so that there was a layer of air between them. Dantone.

Buller (513) relates five cases of successful extraction of pieces of metal from the interior of the eye by means of the electro-magnet. One was from the anterior chamber, one from the sclera near the outer margin of the cornea, which had penetrated into the vitreous and which the forceps had failed to extract. Three were floating in the vitreous. The sixth eye had to be enucleated because of failure to extract the body floating in the vitreous by the magnet. The body was found on examination after enucleation to consist of silica, lime, and carbon, with a slight coating of oxide of iron, which accounted for its feeble reaction to the magnet. BURNETT.

RISLEY (514) has examined and had examined by others a number of packages of smoked coquille glasses, and not one was found in which there was not either a cylindrical, spherical, or prismatic action, often as high as 0.5 D. He recommends plane glasses with parallel surfaces as light protectors, instead of the coquille as commonly used. BURNETT.

JENNINGS (515) has used the new local anæsthetic eucaine and finds that it does not lose its effect by keeping, and may be sterilized without deterioration. It does not cause ischæmia, but on the contrary produces vascular dilatation. There is only a slight dilatation of the pupils, and the accommodation is not affected. There is no drying of the epithelium of the cornea.

BURNETT.

JENNINGS (516) figures a modification of the skiascope, which consists of a chain of lenses like that in a Morton ophthalmoscope, which is turned by the surgeon by means of a rod passing through the axis of a cog-wheel. It has an arrangement for using cylinders in addition. The reviewer thinks he has seen a somewhat similar apparatus of English make. BURNETT.

In HANSELL'S (517) experience, whereof he relates two cases, homatropine cannot be relied upon to completely paralyze the accommodation in young people. BURNETT.

JACKSON (518) describes a modification and improvement of his binocular corneal loupe described sometime ago. It consists of two tubes whose lower ends are joined at an angle of 40 degrees. The lower ends of these tubes are fitted with lenses of 20 or 40 D according to the magnifying power desired. These lenses have surfaces bearing a relation of 6 to 1 in the curvature, the stronger curve being inward. The upper ends of the tubes are fitted with prisms of 20 prism-diopters, with their lenses turned inwards towards each other. These prisms render the diverging pencils of the tubes somewhat less so, and enable eyes with a slight convergence to focus them on the maculæ of the two eyes. The magnification secured is from 8 to 15 diameters, with the important additional quality of depth to the image. It is made by Wall and Ochs, of Philadelphia. BURNETT.

In PINCKARD'S (519) case, a woman of forty-eight years, who, after a drop of scopolamine solution, 1 gr to ℥ i, was placed in the conjunctival sac, gave evidences of strong intoxication similar to those of atropine, the pulse was accelerated, throat parched and dry, and there were great nervousness and some muscular twitchings, but no mental phenomena. Tension of the eye was markedly increased, + 1. The symptoms lasted 36 hours. She had previously used homatropine with no ill effect; vision normal. BURNETT.

RUST'S (520) forceps for expression in trachoma are a combination of Knapp's and Noyes's, being open at one end and having one roller instead of two. BURNETT.

JACKSON (521) thinks that homatropine properly applied—a drop on the upper portion of the cornea every five minutes for 5 or 6 times—is capable of producing a complete paralysis of accommodation in about an hour. It is less likely to produce general toxic effects or an outbreak of glaucoma or conjunctival irritation than other mydriatics. Its effects pass off much sooner and more completely than any other mydriatic. BURNETT.

IV.—ANATOMY.

522. PACETTI. On the nucleus of origin of the abducens nerve. *Researches made in the laboratory of normal anatomy at the R. Univ. di Roma*, vol. v., 2., p. 121.

523. BIETTI. Contribution to the study of the elastic tissue in some parts of the lid. *Arch. di Ottalm.*, iv., 1–3, p. 1.

524. ALLEN, S. N. Cyclopia. *Med. Record*, Aug. 15, 1896.

In the brain of an insane person who had had a congenital paralysis of the abducens, PACETTI (522) found in the reticular formation, midway between the nucleus of the abducens and the nucleus of the facialis and near the motor nucleus of the trigeminus, a group of ganglionic elements connected by fibres with the abducens nucleus, which the author would designate as an accessory nucleus of the abducens. Since this accessory nucleus is not found in all brains, its presence must indicate a faulty development of the brain which would account for the idiocy. The author also found this condition of the abducens nucleus in another idiot.

Bietti (523) describes the location of elastic fibres which he has found in the tarsus of the upper lid and about the walls of the lachrymal canaliculi. Dantone.

Allen (524) reports and figures a case of cyclopia in an infant which lived a half hour after birth. No account of an anatomical examination is given. Burnett.

V.—PHYSIOLOGY.

525. De Bono. The chronological law in the perception of colors. *Arch. di Ottalm.*, iv., 1–3, p. 23.

526. Ovio. Interpretation of the law respecting the relation of the sizes of sharp images and blurred images. *Rev. génér. d'ophtal.*, 1896, No. 12.

527. Katz, R. Some words on the perception of light in the periphery of the eye. *Arch. d'opht.*, xvi., No. 11, 1896.

528. Dolganow. On the ocular changes following ligation of the gall duct. (Experiments on hepatic ophthalmia.) *Wratsch*, 1896, No. 48–49.

529. Dolganow. On the action of eucaine on the eye. *Wratsch*, 1896, No. 51.

530. Crzellitzer. The Tscherning theory of accommodation, a comprehensive representation after Tscherning's articles the author's experiments. *Graefe's Archiv*, xlii., 4, p. 36.

531. Nagel, W. On compensatory torsion of the eye. *Zeitschrift f. Psychol. u. Physiol. d. Sinnesorganen*, xii., 5 and 6, p. 331.

532. Ulrich. On the channels of exit of the vitreous. *Wiener klin. Wochenschr.*, 1896, No. 53.

533. Helmholtz. Handbuch der physiologischen Optik, parts 10–17. Hamburg and Leipsic, 1895–96. L. Voss.

534. Snellen. Notes on vision and retinal perception, being the Bowman lecture for 1896. *Trans. Ophth. Soc. Un. K.*, xvi., 1.

535. Oliver. Some of the inefficiencies in the methods ordinarily employed by railway surgeons for the detection o subnormal color-perception (color-blindness). *Annals of Oph. and Otol.*, Oct., 1896.

536 Harlan and Woods. Examination of the eyes in the public schools of Baltimore. *Jour. Amer. Med. Assoc.*, Dec. 5, 1896.

De Bono (525), using Hipp's chronoscope and Förster's photometer, made experiments as to the time elapsing between the action of a given color on the retina and the beginning of perception. It was found that the middle of the spectrum most quickly leads to perception, yellow requiring 0.405 sec., red 0,663 sec., and violet 0.716 sec.

Katz (527) examined the eyes of four dogs which had died after ligation of the choledoch duct. The animals lived sometimes as long as 100 days. Anæmia came on, due mostly to the mucoid degeneration of the bone marrow. The liver became cirrhotic, and parenchymatous changes appeared in the kidneys. The intestinal tract became catarrhal with a tendency to ulceration and hemorrhage. The icterus diminished after a time. The animals decrease in weight and finally die from disturbances of metabolism. The eyes exhibit inflammatory and degenerative changes. In the connective tissue the nuclei increase. In the vascular system are found congestion, swelling of the endothelium, proliferation in the vessel walls, dilatation of the perivascular spaces, extravasations, and exudations. In the nervous tissues are found various sorts of degeneration in the protoplasm of the ganglion cells, changes in the nuclei, and enlargement of the intercellular spaces. All these changes cannot be traced to their initial causes, but they do not seem to depend altogether upon disturbances of nutrition. Hirschmann.

Dolganow (529) studied the action of 1 % solution of hydrochlorate of eucaine upon the healthy eye. Anæsthesia came on in 1½–2½ minutes and lasted 5-13 minutes. The instillations are painful. The pupil is not much affected, the accommodation not at all. The tension is lowered somewhat and diffusion from the conjunctival sac into the anterior chamber is hastened. Eucaine possesses no advantages over cocaine.

Crzellitzer's (530) conclusions as to his and Tscherning's work on accommodation are as follows. The breadth of accommodation is less for the marginal rays than for the central, proving that the surfaces of the accommodated lens must be more refractive in the centre than at the periphery. The refractive power is less at the periphery in all surfaces flattened at the periphery, as, for example, in hyperboloids by rotation. The reflection from the anterior surface of the accommodated lens shows that its shape must be nearly that of a hyperboloid. Traction on the zonula does not flatten the lens in toto, but changes its previously spherical surfaces in such a way that the curvature increases in the centre and diminishes in the periphery. It is therefore probable that during accommodation there is traction on the zonula which renders the spherical surfaces of the lens hyperbolic.

With the appearance of the last seven parts of HELMHOLTZ's (533) physiological optics is concluded the second edition of this classic work. The last chapters were edited by Arthur Koenig after the author's death. Little was changed from the first edition, according to the author's wish. But the résumé of the entire literature of physiological optics up to 1892 is not only new but is presented in a most admirable and comprehensive manner.

SNELLEN (534) discusses, in this lecture, the question of linear and square measurement in the determination of V, and color perception, also the effect of the degree of illumination on the acuity of vision, and concludes with a study of after-images.

Although the value of visual perception is not *fully represented* by the linear or even by the square measurement of the retinal image (acuteness of V diminished towards periphery of fovea, and minute movements of the eye taking place), nevertheless the linear measurement fully answers the wants of clinical work and is rapid and simple. Within certain limits it is found that letters possessing the same superficies, whether oblong or square, can be recognized at the same distance, and this holds good for colored letters ; and therefore it is suggested for simplicity that color should also be measured by the linear method, as it is subject to the same rules as form, in this respect. For accurate measurements of V, it is necessary to determine the degree of illumination of the standard types, and this is very difficult especially in daylight. Careful experiments were made by two of Professor Snellen's pupils, to determine the effect of the illumination on V both by artificial light and by daylight. On account of difference in quality and pressure of gas, a special arrangement with benzine was used, and in the daytime the degree of illumination on the surface of the test types was measured by L. Weber's photometer, using test types on paper tinted the same color as the flame with which the daylight is compared. When the illumination is intense, considerable changes are hardly perceived. *The maximum of vision is reached at about fifty standard candles*, while any diminution is clearly perceived. The divergence of the results of previous experimenters is alluded to, and it is pointed out that

$\frac{6}{6}$ does not always represent full vision, and that the maximum of each individual acuity should be taken as basis. Two great difficulties in making these experiments are the adaptation of the eye and keeping the illumination constant. The eye should be covered when not being tested. The results are shown in curves which are similar for linear and square measure. The curve of binocular vision is higher than for monocular, but never so much as double the height. No definite law, expressing the relation between the degree of illumination and the visual acuity, could be made out.

As a result of these studies Snellen has had his operating theatre painted completely black, with one window facing the north, care being taken by the operator not to look at the window, so as to avoid alterations in the adaptation.

The after-images of light and color were studied in absolute darkness, the observation screen being illumined by an electric flash reflected on to it by a concave mirror, the flash being of course hidden from the observer. The following phenomena were observed : the screen lights up with the flash, the intensity rapidly increasing and then diminishing ; during the decrease the color seen is the opposite to that of the screen ; this occurs with all colors if sufficiently saturated. The whole thing lasts one second. " The feebler the exciting, the longer the after-image " is only true because, as the white light, the color becomes more saturated. A third phase follows, of longer duration, in which a dull reddish-brown is seen ; there is then anæsthesia for objective light in this area, which will become visible at once if the eye moves. After this there is a disappearance and reappearance of the same phenomena. If a feeble light be looked at continuously, it slowly fades away and *gradually* reappears, differing from the sudden reappearance due to motion of the eye. According to Hering this is due to the reciprocal effect of assimilation in the surrounding retina. WERNER.

OLIVER (535) here reiterates what he has insisted upon on various occasions, that in testing for color-blindness in railway employés, the near test by wools is not sufficient. The tests should be made at a distance and by the means and under the circumstances of atmosphere and general surroundings in which the lights are usually observed by the person under examination. All employés who are suspected of intoxication from tobacco or alcohol should be subjected to frequent examinations.

BURNETT.

The system used by HARLAN and WOODS (536) was imperfect, owing to the conditions under which the examinations of the school children were made, but some important information was elicited. 53,333 pupils were tested as to their vision—43 % had $\frac{20}{20}$ in each eye, and, in addition, 39 % had $\frac{20}{30}$ in the better eye; 15 % came between $\frac{20}{30}$ and $\frac{20}{200}$, and 0.56 % had less than $\frac{20}{200}$ in the better eye. The largest percentage of bad vision was in the lowest and highest grades. BURNETT.

Sections VI.–XI. Reviewed by PROF. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

537. KAYSER. On the operative treatment of high myopia. *Württemb. Med. Corr.-Blatt.*, 1896.

538. LUCCIOLA. Surgical treatment of astigmatism. *Arch. d'opht.*, xvi., 10, p. 630.

539. PERGENS. Relation between unilateral astigmatism and unilateral ptosis. *Presse méd. belge*, May 3, 1896.

540. LAWFORD and CROSS. A discussion on the operative treatment of high myopia. *Brit. Med. Journ.*, 1896, No. 1863, p. 631.

541. JACKSON. The correction of anisometropia. *Amer. Journ. of Ophth.*, Oct., 1896.

KAYSER (537) reports on twenty-eight cases of discission of the lens in cases of myopia between 12 and 22 D. The patients ranged in age from nine to forty-six years. In eight the operation was done in both eyes. One failure apart, an increase in acuteness of vision was obtained in almost every case.

LUCCIOLA (538) undertook, in ten cases, to correct the corneal astigmatism by making a corneal incision. He found that, after a single incision, the decrease in astigmatism mostly did not exceed 1. D, but the patient experienced a relatively greater increase in the facility of seeing. *Contrary to the changes in corneal curvature after iridectomy and extraction, incision of the cornea without escape of aqueous leads to an increase in the radius of curvature of that meridian in which the incision lies.* V. MITTELSTÄDT.

JACKSON (541) points out the fact that the difficulty in correcting anisometropia does not lie in the difference in the sizes of the retinal images so much as in the prismatic action of the stronger lens when the eyes are used other than in direct vision. All lateral fixation is liable to be accompanied either by double images or a muscular strain to prevent them. It is a matter, however, that can only be settled by the experience of each individual. In every case the lenses should be worn as close to the eyes as possible, as this reduces the prismatic effect to its minimum. BURNETT.

VII.—LIDS.

542. PALERMO. On the etiology of chalazion. *Annal. di Ottalm.*, xxv., 5–6, p. 481 and 559.

543. WINTERSTEINER. Cysts of the lid margin. *Arch. f. Augenh.*, xxxiii., supplementary number, p. 115.

544. SCHIMANOWSKY. On congenital cysts of the lower lid with microphthalmus. *Wjest. Ophth.*, xiii., 4–5.

545. TROUSSEAU. Continued favorable results from some operations for epithelioma of the lids and conjunctiva. *Arch. d'opht.*, xvi., 10, p. 625.

546. SGROSSO. The marginoplastic of Prof. Scimeni in the treatment of trichiasis and entropium. *Lav. d. clin. ocul. d. R. Univ. di Napoli.*, iv., 4, p. 317.

547. TERSON. The treatment of senile ectropium. *Ann. d'ocul.*, cxvi., p. 441, and *Arch. d'opht.*, xvi., 12, p. 761.

548. GOLDZIEHER. On a case of bilateral congenital coloboma of the lid. *Centralbl. f. prakt. Augenheilk.*, 1896, p. 359.

549. WOLFF. The advancement of the levator with section of its insertion. Two new methods of operating for congenital ptosis. *Arch. f. Augenheilk.*, xxxiii., p. 125.

550. ALT. Xanthelasma tuberosum or molluscum contagiosum? *Amer. Journ. of Ophth.*, Nov., 1896.

551. SMITH, H. E. Symblepharon. *Annals of Ophth. and Otol.*, Oct., 1896.

552. THEOBALD, SAMUEL. A novel way of wearing an artificial eye. *Amer. Journ. of Ophth.*, Aug., 1896.

In a paper of 100 pages PALERMO (542) discusses the present views on chalazion, and the experiments and investigation made by himself and others to establish its nature. DANTONE.

According to WINTERSTEINER (543) the cysts of the lid margin arise from the lymph-vessels or the glands there located. The cysts contain a clear, colorless, odorless fluid, with sulphate of lime crystals ; the walls consist of tense fibrillar connective tissue ; and the lining is epithelium.

Trousseau (545) reports on six cases of advanced epithelioma affecting the lids or the conjunctiva. In one case the lachrymal sac was involved, and in another the cornea. The lid operations, which were not plastic procedures, were followed by favorable results, and not a single recurrence has taken place, although the patients have been under observation for from three to eight years. v. Mittelstädt.

Sgrosso (546) has made with satisfactory results six entropium operations after the method of Scimeni, who several years ago modified the Jaesche-Arlt operation. In this operation a flap of skin parallel to the lid margin is loosened and set into the split in the lid margin, but its end attachments are not cut through until it has healed in. Dantone.

Terson (547) does the operation for senile ectropium in the following way : After ectropionizing the lower lid, the thickened conjunctiva is removed in a wedge-shaped mass from commissure to commissure. Near the outer commissure an equilateral triangle of skin is removed, with its perpendicular side toward the commissure. Silk sutures are then introduced. Sulzer.

Goldzieher (548) observed a case of congenital right-angled coloboma of both upper lids in a girl of nine. An operation was successfully done.

Alt (550) has made a histological examination of two cases of xanthelasma tuberosum in addition to those made some years ago and published in these Archives (vol. vii.). He still adheres to his opinion, that the change is a degeneration of the epithelium of the sebaceous glands. From a histological examination of a case of molluscum contagiosum, he is inclined to think there is a close connection between these and xanthelasma. Burnett.

In the case reported by Smith (551), there was an extensive symblepharon below the cicatrix invading the cornea in its lower half. A careful dissection was made, relieving all adhesion and tension, and the denuded space on the ball, which was very large, was filled in with the conjunctiva taken from a rabbit. The flap united perfectly, and the motility of the eye was restored.

Burnett.

As a curiosity, Theobald (552) relates the case of a patient who, on account of the shrinking of the conjunctival sac and almost complete disuse of the orbital cavity, wore his artificial eye outside the lids in the manner of the monocle as worn by some Englishmen. Burnett.

VIII.—LACHRYMAL APPARATUS.

553. Schimanowsky. On extirpation of the tear-sac. *Wjest. ophth.*, xiii., 4–5.

554. Boucheron. Antistreptococcus serum in the treatment of rebellious purulent dacryocystitis due to streptococci, and of other ocular streptococcus inflammations. *Ann. d'ocul.*, cxvi., p. 379.

555. Dumont. Dacryops. *Journ. méd. de Bruxelles*, April, 1896.

556. McCassy, T. H. Lachrymal disease. *Journ. Amer. Med. Assoc.*, Dec. 19, 1896.

Schimanowsky (553) recommends the extirpation of the tear-sac in all obstinate cases of dacryo-cystitis.

According to Boucheron's (554) experience, streptococcus dacryo-cystitis disappears in a few days, together with the accompanying conjunctivitis and rhinitis, when three or four injections of 5 *ccm* of streptococcus serum are made at intervals of several days. He also recommends these injections as a prophylactic measure before extraction, when suppuration exists in the sac. Sulzer.

In the treatment of strictures of the nasal duct, McCassy (556) returns to the silver canulated style. The head can be hidden in the sac, and remain for years without causing any disturbance.

Burnett.

IX.—MUSCLES AND NERVES.

557. Parinaud. History of strabismus and its treatment. *Ann. d'ocul.*, cxvi., p. 401.

558. Straub. Squinting in conditions of Amblyopia. A provision for assisting nature. *Genees en Heelkunde*, 1896, p. 88.

559. Panas. Double external ophthalmoplegia hereditary in six members of a family. *Arch. d'opht.*, xvi., 12, p. 721.

560. Gourfein. Double ophthalmoplegia hereditary in six patients of a single family. *Ann. d'ocul.*, cxvi., p. 447.

561. Rochon–Duvigneaud. Some cases of paralysis of all the orbital nerves (ophthalmoplegia with amaurosis and anæsthesia in the domain of the ophthalmic) of syphilitic origin. *Arch. d'opht.*, xvi., 12, p. 746.

562. Procopovici. On congenital bilateral paralysis of the abducens and facialis. *Arch. f. Augenheilk.*, xxxiv., p. 34.

563. Silex. On progressive paralysis of the levator. *Ibid.*, xxxiv., p. 20.

564. Maxwell and others. A discussion on precision in squint operations. Ophth. section, Brit. Med. Assoc. *Brit. Med. Jour.*, Sept., 1896, p. 818.

565. Maxwell, P. W. The effects of nasal obstruction on accommodation. *Ibid.*, p. 825.

566. Ahlström. On recurrent oculomotor paralysis. *Ophth. Review*, xv., p. 177.

567. Wood, Casey A. The field of monocular fixation and its relation to heterophoria. *Jour. Am. Med. Assoc.*, Nov. 28, 1896.

568. Valk. An operation for shortening the ocular muscles in asthenopia, etc. *N. Y. Med. Jour.*, Nov. 7, 1896.

Parinaud (557) says that the history of strabismus and its treatment started on a false principle which originated in the result of tenotomy, and consisted in the muscle theory of squint. Graefe is its major prophet, although not its originator, and it was Jules Guérin who in 1841 stated that the theory of squint must be reconciled to the operative results, and that Buffon's innervation theory must yield before the muscle theory. Boehm, a pupil of Dieffenbach's in 1845, separated convergence from lateral motions. In 1842 Bonnet had substituted tenotomy for myotomy and improved the technique. The supporters of the muscle theory were forced to accept these better results, particularly since the results of the advancement introduced by Guérin seemed to point in the same direction.

In conclusion, Parinaud shows that the operative procedures do not act solely on the muscular apparatus, and that their results do not contravene the innervation theory.

Panas (559) reports on an observation by Gourfein of congenital complete paralysis of the extrinsic and levator muscles, which was found in the paternal grandmother, the father, and four sons, while both daughters were normal. Besides a marked flattening of the arch of the brows, there was rotary nystagmus. The acuteness of vision was very much reduced. In one case there was a white excavated disc, but no other ophthalmoscopic abnormality. Pupillary reaction and accommodation were normal. The cause of the affection is obscure. Gourfein regards it as an hereditary amyotrophia and not as a nuclear affection.

v. Mittelstädt.

In Rochon-Duvigneaud's (561) first case there appeared ptosis, immobility of the right eye, and anæsthesia of the region supplied by the frontal nerve, besides optic neuritis and diminution of vision. A diagnosis of syphilitic periostitis in the region of the optic foramen and sphenoidal fissure was made, and under the use of mercury and iodide of potassium the symptoms soon disappeared entirely. In two other cases there were similar paralytic conditions, slight papillitis, and complete amaurosis in the affected eye. The cornea was anæsthetic, the pupil dilated, and only reacting consensually. Lachrymal secretion normal. No exophthalmus. Specific treatment caused the paralyses to disappear, but did not prevent blindness from optic-nerve atrophy. In a fourth case, in which the optic nerve was not involved, there was complete recovery. The sharply limited extent of the paralyses, the lack of nutritive disturbances in the cornea which would have indicated involvement of the ganglion of Gasser, and the absence of exophthalmus exclude both an intracranial and an orbital gummous affection, and point toward the optic foramen and the sphenoidal fissure as the sole seat of the disease.

v. Mittelstädt.

Procopovici (562) observed in a girl of seven a left congenital complete paralysis of the facial nerve, a right incomplete facial paralysis, and a complete paralysis of both abducens nerves. He believes that the entire condition here depends upon an irregular disposition of the nerve nuclei.

Silex (563) reports on two cases of progressive paralysis of the levatoı in women respectively sixty-two and sixty-eight years of age. The first was healthy until the first symptoms of paralysis appeared four years before and gradually became complete. The cause was probably a slowly progressive atrophy of the levator, and this view is supported by the fact that in the ptosis operation a piece of the levator was removed, and was found to show an increase in fat and connective tissue, and a degeneration of the muscle fibres.

P. W. Maxwell (564) read a paper giving conclusions drawn from analysis of 179 operations, which are not suitable for abstraction. The angle γ in 51 cases averaged nearly 2° less in the squinting eye, and vision diminished with the angle γ. Probably a new fixation point is established. In Swanzy's operation for advancement the primary result is greater than in De Wecker's, but the secondary is less. Maxwell has, in a few cases, endeavored by means of a special instrument to gauge the amount of advancement. He believes that the angle γ becomes positive and more equal to the sound eye after operation, showing that the squinting eye co-operates with its fellow even when full binocular vision does not occur. Latent relative convergence or divergence may modify the effect of an operation. In most of the cases the degree of squint was more than 3° for each D of H. Glasses produce less than the reduction calculated as above.

LANDOLT drew attention to the frequently inaccurate knowledge of the motor apparatus and the nature of strabismus. It should be remembered that alterations in "innervation," and not changes in the muscles, are the primary causes. The centre of mobility of the eye is not a fixed point, and its position is influenced by the combined actions of muscles, hence the disadvantage of tenotomy, which allows the centre to fall forward. Precision in the operation is only obtained by nature. Binocular vision is the surgeon's great ally.

BERRY thought precision need not be attempted, and that a little convergence should be left.

BICKERTON thought that precision, if possible, would be best obtained by Stevens's method of tenotomy. WERNER.

MAXWELL (565) examined the nasal conditions in all asthenopes, where the vision was good and the refraction error low, and he came to the conclusion that obstructed *breathing* gives rise to asthenopia. He cites five cases which he believes to have been relieved or cured by nasal treatment. Rayner Batten agreed with these views, but, moreover, thought that nasal conditions frequently produced myopia, and were frequently associated with a crescent on the nasal side of the disc. He finds that in nasal obstruction forced expiration produces slight myopia, forced inspiration slight hypermetropia. WERNER.

AHLSTRÖM'S (566) patient, a healthy man, aged fifty, suffered from recurrent attacks of paralysis of left third nerve, including the intraocular muscles. The attacks were accompanied by severe pain in left side of head, and *tenderness* on pressing eyeball into orbit. There was a slight discharge from left *nostril*, which ceased with onset of eye trouble. A nasal douche removed headache and eye symptoms in subsequent attacks. The author believes that the catarrhal inflammation of the frontal sinus caused reflex circulatory disturbance in the region of the oculo-motor region. (Would not direct pressure be a more plausible explanation? See Holmes's paper, these ARCHIVES, xxv., p. 460.—L. W.) WERNER.

Wood (567) has devised a method of subjectively determining the field of monocular fixation by means of the perimeter. He has short words printed on a strip of paper to be fitted on the inner side of the arc of the perimeter. These words are situated at places marking the degrees from the point of fixation. The most remote letters made out will indicate the outer limits of the field of fixation for that eye. He finds that the limit of the field of monocular fixation determined in this way differs but little from that determined by Landolt. As each eye can be taken separately, the disturbance of muscular balance in heterophoria can be easily ascertained and registered. Burnett.

Valk's (568) method of shortening the ocular muscles is to take a tuck in it without separating it from its scleral attachment, as follows: The conjunctiva is opened along the length of the muscle, and the muscle separated from the surrounding tissues by two ordinary strabismus hooks pulling in opposite directions. A kind of double hook, with the two ends held apart by a spring, is then introduced under the tendon, serving to keep the tissues on the stretch. A catgut suture, o. or oo., is then passed first through the scleral end of the tendon and, passing under it, is brought out from within at that place on the muscle where it is deemed best according to the effect desired; passing over the muscle, it is inserted from without in at the lower edge and, passing under the muscle, brought out at the scleral end. The suture is then tied, making a fold in the muscle. Twenty cases are related in which this method has been tried. Burnett.

X.—ORBIT AND NEIGHBORING CAVITIES.

569. Königstein. Notes on the anatomy and physiology of the orbit. *Beiträge z. Augenheilk.*, xxv., p. 1.

570. Lodato. Fibro-myoma of the orbit. *Arch. di Ottalm.*, iv., 3–4, p. 120.

571. Sgrosso. Orbital dermoid with remains of ocular tissues. *Lav. d. clin. ocul. d. R. Univ. di Napoli*, iv., 4, p. 323.

572. Sureau. Orbital tuberculosis. *Ann. d'ocul.*, cxvi. p. 374.

573. Armaignac. Sero-sebaceous cyst of the orbit. *Ibid.*, p. 383.

574. Lancial. Facial and ophthalmic phlebitis cured by the early destruction of the angular vein and infraorbital structures by means of the thermo-cautery. *Ibid.*, p. 370.

575. Abadie. Nature and surgical treatment of exophthalmic goitre. *Arch. d'opht.*, xvi., 2, p. 667.

576. Belt, E. Oliver. Sponge grafting in the orbit for the support of artificial eye. *Journ. Amer. Med. Assoc.*, Nov. 7, 1896.

577. Sattler, Robert. Excessive hemorrhage after enucleation of eyeball. *Ibid.*, Nov. 21, 1896.

Angelucci removed an almond-sized tumor from the upper part of the orbit, where it has existed for thirteen years. Lodato (570), who examined the growth, found it to be a myoma composed of unstriped-muscle fibres. The three other cases of orbital myomata reported were all of the striped-muscle variety. The author assumes that the growth originated in the groups of unstriped-muscle fibres found in the orbit by many observers.

Dantone.

Sgrosso (571) describes the orbital contents of a pig that was born blind. In place of an eye was a dermoid tumor in which remains of muscular tissues and of a rudimentary optic nerve were found. Dantone.

In a case of anthrax pustule of the upper lid in a man of nineteen, Lancial (574) observed, immediately after the appearance of the swelling of the lid and the chemosis, signs of beginning thrombosis of the facial vein, and burned through this vessel and the tissue of the inner angle of the orbit, thus preventing thrombosis of the ophthalmic vein and infection of the orbit.

Sulzer.

According to Abadie (575) Basedow's disease is due solely to an affection of the vessel-dilating fibres of the cervical sympathetic. The enlargement of the thyroid is a secondary symptom which may be insignificant even with exophthalmus of high degree and considerable tachycardia. The contrary may also be the case. From this we are warranted in believing that section of the cervical sympathetic above the middle ganglion or removal of the latter would favorably affect the exophthalmus. This operation was performed by Jaboulay, when removal of the thyroid had been unsuccessful, and permanently relieved the exophthalmus.

In the cases in which the latter is excessive, threatening the destruction of the cornea, this operation is certainly indicated. The transient results after extirpation of the thyroid depends, in Abadie's opinion, upon the simultaneous removal of a portion of the sympathetic. v. Mittelstädt.

Belt's (576) operation consists in removing the eye by the ordinary process of enucleation under strict asepsis. After hemorrhage is arrested, the socket of Tenon's capsule is washed out with formalin solution 1 to 1000. A globe of fine sponge ¾ the size of the ball is then inserted, after having been previously sterilized in a 5 % solution of formalin. The conjunctiva is brought together over it and sutured. In a few weeks the sponge is filled with new tissue which in time becomes firm. The sponge fibres are apparently absorbed. Burnett.

Of the two cases of excessive hemorrhage after enucleation reported by Sattler (577), the first was a "bleeder," 16 years of age. In spite of all sorts of compresses, hypodermics, etc., the bleeding continued, the orbital cavity was filled, and its contents protruded like a large mass of sarcomatous material. There was fever, delirium and great prostration. A part of the mass and some of the edges of the lids finally sloughed. It was four weeks before the conjunctiva finally fell back in place. In the second case, not a bleeder, the hemorrhage came on some hours after enucleation and was controlled with difficulty only on the fourth day. The patient was much exhausted. Burnett.

XI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

578. Gelpke. Acute epidemic conjunctivitis and its micro-organism (Bacillus septatus). *Graefe's Archiv*, xlii., 4 p. 97.

579. Romiée. The purulent ophthalmia of the new-born. *Le Scalpel*, 1896, Feb. 2.

580. Villard. The bacteriology of granular conjunctivitis; general review. *Montpellier méd.*, 1896, March 5.

581. Cazalis. A bacteriological study of granular conjunctivitis. *Thèse de Montpellier*, 1896.

582. Leber. On the pathology of trachoma. *Report of the 25th meeting of the German Ophth. Soc.*, 1897, p. 156.

583. Hirschmann. A case of primary syphilitic affection of the conjunctiva. *Wiener klin. Woschenschr.*, 1896, No. 52.

584. Lagrange. Lepra of the bulbar conjunctiva. *La presse méd.*, 1896, April 8.

585. De Beck. Subconjunctival cysts. *Annals of Ophth. and Otol.*, Oct., 1896.

586. Keyser. Double pterygium on one side in a young subject. *Ibid.*

587. Higgins F. W. Œdema of the conjunctiva. *Journ. Amer. Med. Assoc.*, Nov. 21, 1896.

588. Maclochlan, D. A. Pemphigus conjunctivæ—a case. *Homœpathic Eye, Ear, and Throat Journ.*, Feb., 1896.

In two villages near Carlsruhe, Gelpke (578) observed an extensive epidemic of conjunctivitis, with great swelling of the lids, with a watery and, later, muco-purulent secretion. There were marked photophobia and pain. The retrotarsal folds were swollen, of a dark red color, and dotted with hemorrhages. Later the conjunctiva became rough and exhibited folds and follicles. The hyperæmia and swelling extended to the bulbar conjunctiva, and led to perikeratic injection, and later to numerous marginal punctate infiltrations of the cornea. The affection was very contagious, and lasted eight to fourteen days, rarely leaving complications. Cultures of the secretion led to the discovery of a bacillus which probably caused the disease. This was aërobic, and grew in various media, provided they were mildly alkaline. The bacillus proliferated by division and by spore formation. Inoculations on rabbits led to no results, but these were sometimes successful on the human conjunctiva. Gelpke proposes to designate the bacillus as "Bacillus septatus," or "Bacillus septatus conjunctivitidis epidemicæ." (To prevent further confusion in a matter already sufficiently complicated, it may be noted here that all who have commented on Gelpke's paper have agreed in believing that the bacillus he describes is none other than the innocent xerosis or pseudo-diphtheritic bacillus, which may be cultivated from almost any conjunctival secretion. The Weeks bacillus, which the clinical histories would lead one to believe to be the cause of the epidemic, is much smaller than the xerosis bacillus, and is easily overlooked in the secretion ; furthermore, since the Weeks's bacillus grows less readily in cultures than the other, it might soon be lost sight of when cultures alone were studied.—Translator.)

Romiée (579) is a decided opponent to the use of nitrate of silver for the purpose of preventing blennorrhœa neonatorum. He cites four cases in which the employment of Credé's method was followed by opacities in the lower half of the cornea, which persisted for months.

Hirschmann (583) observed a hard tumor in the right upper lid of a man of thirty-seven, which reached to the orbital margin. Corresponding to the tumor there was an ulcer of both tarsal and bulbar conjunctiva at the fornix. The patient was supposed to have been infected by using a soiled towel. Iodoform was dusted on and yellow-oxide salve applied, the tumor and ulcer disappearing, but a secondary rash came on later.

In DE BECK'S (585) case the cysts were found inside of the lower lid, near the inner canthus, of a colored girl of fifteen years —one oblong, 15 *mm* long by 5 *mm* diameter; the other pear-shaped, 10 *mm* long by 6 *mm* in diameter. The larger one was removed entire, the other collapsed. The conjunctiva over them was movable. The one examined was lined with a single layer of endothelial cells. It seems probable that these cysts are derived from the lymph vessels, most likely by a plugging of their calibre, and subsequent dilatation. BURNETT.

KEYSER (586) describes and pictures an unusual form of pterygium having two apices on the same side—the outer. It was very large, covering nearly one half the cornea. It was loosened from its corneal attachment, and tucked under the conjunctiva some little distance from the corneal edge, and the denuded space on the sclera filled by conjunctival flaps from above and below. BURNETT.

In the case reported by HIGGINS (587), a man of twenty-two years, suffering with albuminuria, had an excessive and long-continued chemosis of the conjunctiva of both eyes. The cornea was hidden from view, and the eyelids could not be closed over the protruding membrane. No drug had been administered which was likely to produce such a condition. There were also changes in the choroid. The patient died not long after. BURNETT.

MACLOCHLAN (588) reports an interesting case of what seems to be true pemphigus of the conjunctiva. When seen, the disease was in the second stage, and there was almost complete union between the eyeball and lids in both eyes. In one eye there was an ulceration of the cornea. On the conjunctiva that was still visible there were the ulcerations with greyish deposits which are characteristic of the disease. The affection had existed nine months when first seen by Maclochlan. There were also bullous eruptions in the mouth and pharynx, the naso-pharyngeal passage being almost closed from the cicatricial contraction. It had also invaded the prepuce and possibly the rectum, but the skin was everywhere intact. The process was watched as it appeared in the mouth. There were first yellowish-gray vesicles, slightly raised, filled with turbid serum. These broke before being fully formed, leaving a raw but scarcely sensitive surface which cicatrized in from a few days to as many weeks. General health good.

BURNETT.

589. BOCCI. Panophthalmitis, exenteration of the ball, cerebro-spinal meningitis, due to the diplococcus of Fraenkel.

590. DE LIETO-VOLLARO. On colloid in the corneal epithelium. *Lav. d. clīn. ocul. d. R. Univ. d. Napoli*, iv., 4, p. 347.

591. STEVENSON. Treatment of corneal opacities by electrolysis. *Brit. Med. Jour.*, Sept., 1896, p. 826.

592. DE SCHWEINITZ. Incised wound of the corneo-scleral junction ; prolapse of the iris ; blood-staining of the cornea. *Phila. Polyclinic*, Sept. 5, 1896.

593. BAKER, A. R. Dermoid tumors of the cornea. *Jour. Am. Med. Assoc.*, Oct. 17, 1896.

In BOCCI'S (589) case of purulent infiltration of the cornea which in a short time passed over into panophthalmitis, death followed five days after exenteration of the ball from cerebro-spinal meningitis. Blood and various tissues removed from the body showed that the cause of the disease was the Fraenkel pneumococcus. DANTONE.

DE LIETO-VOLLARO (590), after carefully examining a case, concluded that colloid in the cornea is a product of the epithelium and arises from the degeneration of the cell elements.

DANTONE.

STEVENSON (591) has had good results from this method. He applies the kathode in the form of a small silver *rod* with rounded end to the cornea, using a current of $\frac{1}{4}$ to $\frac{1}{2}$ a m. amp. Faint nebulæ which have resisted ordinary treatment are disposed of in six to ten applications.

HOLMES SPICER had seen remarkable results from the treatment in old cases of interstitial keratitis. He used an electrode with a small metallic *cup* at its end, to which a small globule of mercury was adherent. The mercury secured better apposition.

WERNER.

The interesting feature of the case of DE SCHWEINITZ (592) is the staining of the cornea, which remained after the absorption of the blood from the anterior chamber. The cornea assumed a brownish-green color except a small rim 2 *mm* in diameter at the circumference. An account is given of other cases and the examination of the condition by the microscope by T. Collins and Weeks, showing the discoloration to be due to granules of hematoidin. BURNETT.

BAKER (593) records two cases of dermoids of the cornea, one 1 inch by $\frac{1}{2}$ inch and studded with black hairs. It was pedunculated and occupied the lower outer half of the cornea. It was peeled off and left transparent cornea beneath. The other had three small tumors on the left cornea, two at the outer sclerocorneal margin; the third extended as a line almost perpendicularly across the pupils at the centre of the cornea. They were separated from each other by clear cornea. They were all removed and fairly good vision restored—$\frac{20}{200}$. BURNETT.

Sections XII–XXI. Reviewed by DR. SILEX.

XII.—IRIS.

594. KARPLUS. Reflex iridoplegia in hysterical attacks. *Wiener klin. Wochenschr.*, 1896, No. 2.

595. SIEMERLING. On the alterations of pupillary reaction in the insane. *Berl. klin. Wochenschr.*, 1896, No. 44.

596. SPIRO. A case of congenital ectropium uveæ. *Centralbl. f. prakt. Augenheilk.*, xx., p. 3.

597. HIRSCHBERG-BIRNBACHER. Carcinoma of the posterior surface of the iris. *Ibid.*, p. 290.

598. WAERTER. Two cases of sarcoma of the iris. *Wjest. ophth.*, xiii., 4 and 5.

599. RUDIN. Cocainization of the iris. *Ibid.*, Nov.–Dec., 1896.

600. DANILOW. The tuberculous affections of the eye. A case of tuberculous irido-cyclitis. *Wojenno Med. Journ.*, May, 1896.

601. HARLAN, G. C. Rupture of the iris at the pupillary margin and in continuity from contusion of the eyeball. *Ophth. Review*, xv., p. 253.

602. LAWFORD. The formation of artificial pupil by extraocular iridotomy. *Ibid.*, p. 221.

603. ALT. A case of apparent non-traumatic double iridodialysis; glaucoma; ciliary staphyloma; detachment of the retinal periphery; choroidal hemorrhages; disseminate chorio-

retinitis and neuritis optica. *Amer. Journ. of Ophth.*, Dec., 1896.

604. Fiske, E. R. Congenital aniridia. *Homœopathic Eye, Ear, and Throat Journal*, Nov., 1896.

It has previously been believed that the pupil reacts in hysterical attacks, and is irresponsive in epileptic attacks. Karplus (594) has now found reflex iridoplegia during the attack in a number of hysterical patients.

In an interesting contribution Siemerling (595) speaks of the great value of reflex iridoplegia in the diagnosis of progressive paralysis. In sixty-eight per cent. of his cases reaction to light was wanting or reduced, and it is frequently a very early symptom. The reflex iridoplegia is bilateral as a rule, and the pupil becomes elliptical or angular. A contraction of the pupil on exposure to light with a quick return to its previous width is observed in some forms of paralysis, as is also the paradoxical reaction—the reversal of the pupillary reflex. Hitherto great weight has been laid upon the difference in the size of the pupils, which was held to be an important symptom of paralysis, but to-day this is not much considered, since it is found in healthy individuals, in functional neuroses, and in general diseases. Jerking mydriasis is now and then observed in paralysis, while hippus is rare in paralysis, but more frequent in other brain diseases. From statistics of 9160 cases of various nervous diseases, the author shows the importance of the pupillary symptoms in paralysis. Dilatation of the pupil without light reaction is the chief differential symptom from hysterical attacks, in which the dilated pupil reacts. In general paralysis the pupillary reaction to sensory stimulation is lost first, reaction to light following, while in tabes this is reversed, according to Bewan. A very marked reaction occurs in epileptics after the attack, and in cases of extensive circulatory disturbances and morphinism. Many experiments have been made in regard to the location of the affection producing this symptom. It has not been possible to find a particular group of nuclei in or near the oculo-motor nucleus which could be made answerable for the pupillary reflex. But it is known that the centripetal pupillary fibres semidecussate in the chiasm, this being proved by the condition of consensual reaction in incomplete reflex iridoplegia. In each tract indeed are fibres from both eyes ; one tract suffices both to receive the excitation to contraction of the iris from the two eyes, and also to conduct the excitation to both oculo-motor nerves. There must be therefore a partial crossing of the pupillary fibres peripheral to the tract, in the chiasm, and also one central to the chiasm.

In a man of twenty-six, whose case is reported by HIRSCHBERG and BIRNBACHER (597), a tumor appeared on the posterior surface of the iris near the upper pupillary margin, which was partly covered by the pigment layer. An iridectomy was made, and as the pain became severe, enucleation was finally performed. Behind the iris, displacing the lens, was a tumor 10 *mm* by 5 *mm*. Microscopically this consisted chiefly of epithelial cells arranged in tracts and cylinders without intervening substance. The cells were derived from the proliferating cells of the pigment layer. On the ground of its histological structure the tumor was regarded as a carcinoma.

WAERTER (598) continues the scheme of summarizing all the cases of sarcoma of the iris utilized by Fuch in 1882. Since then twenty-three cases have been described, and before 1882, seventy-six. The author's two new cases are as follows: 1. In a woman of seventy-two, a small, pigmented tumor appeared in the inner-lower portion of the chamber angle of a blind eye. The tumor, which was composed of pigmented spindle cells, had destroyed the tissue of the iris up to the pupillary margin, leaving the sphincter intact. It also extended into the ciliary body, infiltrating the ligamentum pectinatum. 2. In a woman of sixty, a small brown tumor appeared in the inner-lower portion of the iris. $V = \frac{2}{5}$. Examination showed this tumor to be in all respects similar to the first. The greatest number of cases were between the ages of forty and sixty, and women were more frequently attacked than men. Even the tumors which are apparently small, have usually extended deep, and, notwithstanding good vision, enucleation is preferable to iridectomy.

HIRSCHMANN.

In order to make the iris less sensitive during operation, RUDIN (599) injects a small quantity of cocaine in bichloride solution beneath the conjunctiva at the upper margin of the cornea. The vesicle there produced is pushed round the cornea with a pledget of cotton. In eleven operations the result was satisfactory in eight, and partially so in two. In one prolonged operation the patient complained of pain. (Koller's method.—ED.)

HIRSCHMANN.

DANILOW (600) gives a résumé of the literature of ocular tuberculosis—59 cases of affection of the conjunctiva, 5 of the cornea, 31 of the iris, 7 of the ciliary body, 29 of the uveal tract, 6 of the retina and optic nerve, and 5 in the lachrymal gland.

In his own case of tuberculosis of the iris, the patient soon died of pulmonary tuberculosis. Microscopically he found an infiltration (with polynuclear cells) in the cornea, iris, ciliary body, and adjacent portions of the sclera, and also in the lens, with destruction of its anterior capsule. Bacilli were found in small numbers. HIRSCHMANN.

HARLAN (601) records six cases of rupture of the iris at the pupillary edge or in continuity. In three of the cases there was no hyphæma or iritis, and vision was not much lowered. The condition remained permanent, the pupil differing in this respect, according to Harlan, from true traumatic paralysis of the iris, in which recovery generally takes place. WERNER.

LAWFORD (602) practises, with good results, Schoeler's method of extra-ocular iridotomy, in which the iris is carefully withdrawn, as in doing iridectomy, but merely incised, and then replaced in the anterior chamber. It produces an ideal pupil for visual purposes. WERNER.

In this interesting case of ALT (603) there was, in his opinion, some procsss in the anterior portion of the eyeball which led to a cicatricial contraction, which drew the periphery of the iris down to the iris angle, beginning downward and outward, and afterwards affecting the remainder of the iris periphery. The curious feature, however, is that the centre of the iris remained as a band passing across the anterior chamber from above downward, the contraction at the periphery seeming to have torn the iris in two. During the shrinkage the iris had become torn away from the uveal layer. The paper is illustrated with four micro-photographs. BURNETT.

FISKE (604) gives an account of a father and three children affected with congenital deficiency of the iris of both eyes. In one a coloboma with the base inwards in both eyes, one with a slight remnant of the iris to the outer side of both eyes, and in the third practically complete absence of iris tissue. Two other children have normal eyes. No history of consanguinity. BURNETT.

XIII.—CHOROID.

605. VAN DUYSE. Choroidal sarcoma of the macular region with propagation into the orbit. *Arch. d'opht.*, xvi., No. 11.

606. Laqueur. Is there an essential phthisis bulbi? *Report of the meeting of German naturalists and physicians at Frankfort-on-the-Main*, 1896.

607. Grandclément. A new contribution to iridic uveitis.

608. Dor. Contribution to the study of spontaneous detachment of the retina. *Arch. d'opht.*, xvi., No. 12, p. 735.

In Van Duyse's (605) case there was a sarcoma of the macular region, non-recognizable because of a senile cataract, which extended into the orbit along the optic nerve and the posterior ciliary arteries, and revealing its presence three years later by producing a rapidly increasing exophthalmus. The tumor was an alveolar sarcoma arising from the endothelial cells of the intervascular spaces in the layer of larger vessels. Only a small portion of the intraocular portion was pigmented.

v. Mittelstädt.

Laqueur (606) reported a case of hypotony in a healthy eye. After a slight injury of the corneal epithelium hypotony was repeatedly observed, always coming on with simultaneous irritation of the eye. Later the parenchyma of the lower $\frac{2}{3}$ of the cornea became opaque. The attacks then came on at intervals, first in one eye and then in the other. The affection was thought to be due to neurosis of the sympathetic, since other signs existed of disturbance of the sympathetic.

Grandclément (607) designates as "iritis uvéenne" an inflammation of the iris limited to the pigment layer, which comes on particularly in women of middle age, the attacks not being accompanied with much subjective disturbance or symptoms of irritation, and recurring at intervals, the sight gradually diminishing through a period of years. The usual causes of iritis are not present, and no treatment except iridectomy is of benefit. Three cases are reported. Apparently these are cases of what is usually called idiopathic chronic irido-choroiditis. v. Mittelstädt.

Dor's (608) patient, a woman aged seventy-seven, suffered from pain in and about the left eye with increase in tension. The ophthalmoscopic picture was that of a sarcoma of the ciliary region, but when the hardened eyeball was examined no sarcoma could be found. The choroid, however, to which the retina was everywhere adherent, was detached from the sclera in several places by a greenish hyaline exudation. The choroid was œdematous, the vessel-walls thickened but with normal endothelium. About the vessels were small hemorrhages and miliary abscesses free from micro-organisms. The abscess formation, according to Dor, was the primary change, the process being an infectious choroiditis, and the hemorrhages secondary. A sero-albuminous exudation caused œdema of the choroid and detachment. This seems to be the only case of spontaneous detachment of the choroid which has been examined both clinically and anatomically. v. MITTELSTÄDT.

XIV.—GLAUCOMA.

609. DE WECKER. False glaucoma. *Ann. d'ocul.*, cxiii., p. 239.

610. ELSCHNIG. Anatomical examination of two cases of acute glaucoma. *Arch. f. Augenheilk.*, xxxiii., supplementary volume, p. 183.

611. EPINATJEW, S. An unusual case of congenital anomaly of the eyes. *Wjest. ophth.*, 1896, No. 6.

612. WARLOMONT. Two cases of bilateral buphthalmia, with preservation of good vision, observed in two brothers. *Ann. de la société scientifique de Bruxelles*, xxx., part 2.

613. BOCCHI. The incision of the tissues of the iris angle according to De Vincentiis in hydrophthalmus. *Arch. di Ottalm.*, iv., 3–4, p. 130.

614. BIETTI. Ophthalmometric observations on eyes operated on for glaucoma, with special reference to the incision of the tissues of the iris angle (De Vincentiis). *Ann. di Ottalm.*, xxv., 4, p. 319.

False glaucoma, concludes DE WECKER (609) in his paper on the subject, is often confounded with true glaucoma. When the ophthalmoscope alone is depended upon to make the diagnosis, one-half the cases of simple glaucoma are false glaucoma. This false glaucoma is a primary disease of the nerve-head, requiring medicamentous treatment, while true glaucoma, even when of the chronic simple variety, demands sclerotomy. SULZER.

ELSCHNIG (610), refraining from theorizing, simply describes the appearance of two eyes with glaucoma which were examined shortly before death, but not operated upon. The corneal epithelium exhibited degenerative changes, the corneal parenchyma was unaltered, and the endothelium was irregular and exhibited marked changes in the form of the cells. The lens exceeded in all its dimensions the average dimensions of the normal lens. In the ciliary body the circular muscle of Müller was pushed forward, and the ciliary processes pointed toward the iris. The ciliary portion of the iris had acquired an attachment to the ligamentum pectinatum, at some points loose, at others with a close union of the tissues. The iris was not materially affected. The ligamentum pectinatum and the adherent portion of the iris were free from signs of inflammation. The canal of Schlemm was displaced only to a slight extent. The ciliary body and processes exhibited signs of degeneration: in many bundles single muscle cells were transformed into a granular detritus, in other places the entire bundles were thinned. In the ciliary processes the wide lumen of the capillaries and the rarefaction and proliferation of the palisade epithelium were noticeable. The venæ vorticosæ exhibited endo- and peri-vascular changes here and there. The vessels of the choroid were often dilated, and their walls thickened. The optic nerve in transverse section was normal everywhere. The nerve fibres exhibit varicose hypertrophies. In the retro-laminar portion of the optic nerve the nerve-fibre bundles were somewhat thinned, and pervaded with round cells. Many round and oval spaces appeared among the degenerated nerve fibres. The intervaginal space was narrow and cleft-shaped at its bulbar termination, while farther back it was wider.

EPINATJEW (611) describes a case of bilateral hydrophthalmus with cornea globosa, anisocoria, oval pupils, and irido-donesis, with emmetropia and V = $\frac{20}{20}$.

WARLOMONT (612) describes two unusual cases of buphthalmus observed in two brothers. A., æt. thirteen, bilateral buphthalmus, horizontal diameter of cornea 17 *mm*, deep anterior chamber, and tremulous iris. Normal curvature of cornea. The right eye is emmetropic with V = $\frac{2}{3}$; the left obtains normal vision with a — 1.D cylinder oblique.

B., æt. sixteen. Buphthalmus less advanced and unequal in the two eyes. Horizontal diameter of the cornea L 13 *mm*, R 13.5 *mm*. Compound myopic astigmatism of 4. or 5. D. R V = $\frac{1}{2}$, L V = $\frac{1}{3}$. The retina and optic nerve were normal in both cases.

SULZER.

BOCCHI (613) had the opportunity of examining an eye which had been enucleated for infantile glaucoma when three iridectomies and section of the iris angle had not sufficed to relieve the pain. The author states that the filtration spaces were found least altered at the spot where the insertion of the iris was cut through, indicating the superiority of this new operation. Furthermore, the period of freedom from pain lasted longer after the incision of the iris angle than after the three iridectomies.

DANTONE.

BIETTI (614) examined forty-three glaucoma patients with the ophthalmometer, both before and after the operation, in order to determine the effect of increased tension upon the curvature of the cornea, and consequently upon the refraction of the eye. In two-thirds of the cases such changes were found to have occurred in some or all meridians. The eyes were subjected to repeated paracentesis, iridectomy, or incision of the iris angle. In conclusion, Bietti records the favorable results obtained in twenty-three cases by incision of the iris angle. DANTONE.

XV.—SYMPATHETIC OPHTHALMIA.

615. MEYER. A case of sympathetic ophthalmia after subconjunctival rupture of the ball. *Inaug. dissert.*, Jena, 1896.

616. ANGELUCCI. Researches on sympathetic ophthalmia. *Arch. di Ottalm.*, iv., 1–3, and 3–4.

ANGELUCCI (616) examined bacteriologically twelve eyes enucleated after having caused sympathetic ophthalmia, and also portions of the iris removed by iridectomy from the eyes sympathetically inflamed. From the detailed reported results of his inoculations, it is particularly worthy of note that the cocci and diplococci from the iris of the two eyes sympathetically inflamed caused similar inflammatory changes when inoculated into the eyes of rabbits. DANTONE.

XVI.—LENS.

617. ELSCHNIG. On discission. *Wiener klin. Wochenschr.*, 1896, No. 53.

618. DA GAMA PINTO. A contribution to the operation for secondary cataract. *Zehender's klin. Monatsbl.*, xxxiv., p. 294.

619. GALEZOWSKI. On the operation of adherent secondary cataract by incision from behind forward. *Rec. d'opht.*, 1896, p. 587.

620. BERRY–CROSS. A discussion on cataract extraction. Ophth. Section, Brit. Med. Assoc., 1896. *Brit. Med. Jour.*, Sept., 1896, p. 822.

621. WARE, LYMAN. Report of one hundred cases of extraction of hard cataract. *Jour. Am. Med. Assoc.*, Oct. 24, 1896.

622. Harlan, Herbert. A contribution to the question of removal of the lens in myopia. *Ibid.*, Nov. 28, 1896.

Elschnig (617) begins with historical remarks on discission. He has now abandoned the discission needle, which produces a wound that is readily infected, and which is not adapted for cutting through the mass. He employs the method of Schnabel. A Graefe knife is introduced as in extraction, the capsule is perforated low down and then divided by depressing the handle of the knife. In secondary cataract the knife is passed through the cornea at another point. (Schweigger now divides all secondary cataracts with scissors which are introduced through a small wound made with a lance.—Rev.). Discission is never used for ripening senile cataract. All senile cataracts in persons over fifty are readily removable, whatever the condition of nucleus and cortex. Elschnig does extraction as soon as vision becomes too poor to permit the patient to follow his ordinary vocation.

Da Gama Pinto (618) did the operation for secondary cataract 326 times after 528 extractions. He used Knapp's knife, Schweigger's broad needles, De Wecker's scissors, and particularly the Graefe knife. Schweigger has now discarded the needles, since the open space obtained is apt to close when the needles are withdrawn. In 133 eyes he did the so-called posterior discission, in which the Graefe knife is passed through the sclera 6 to 8 *mm* behind the sclero-corneal junction.

Berry (620) has come round to the view that simple extraction, if performed according to Prof. Snellen's method, possesses more important advantages than the cosmetic one. But there are certain cases unsuitable, and if he were to select one operation for all cases, he would still adopt the combined method. In doing Snellen's operation Berry uses a speculum ; at first he experienced a difficulty in preventing the iris falling in front of the knife. Prolapses are very rare in the operation, and when this occurs, it is within an hour or two. Berry performs iridectomy if the iris does not go back so as to form a round pupil. This is necessary in about 10 per cent. of the cases. Iritis is much less frequent than after combined extraction. The visual acuity does not seem better than in the latter. Hard, nuclear cataracts in old people, over-ripe cataracts with capsular opacities, or cases with iritic adhesions or shallow anterior chamber, are reserved for combined extraction.

Cross agreed with Berry's views ; he considers it important not to subject the eye to unnecessary toilette.

LANDOLT also approved of Snellen's operation. WERNER.

The method ordinarily used by WARE (621) is to make a small preliminary iridectomy. The section for the extraction of the lens is always large, generally one-half the circumference of the cornea. Capsulotomy by Knapp's method. Four per cent. of losses. The majority had vision $\frac{1}{10}$–$\frac{1}{2}$, and two cases $\frac{1}{1}$.

BURNETT.

The two cases which HARLAN (622) contributes to the question of lens removal in myopia were both accidental. In one the lens was dislocated into the anterior chamber in a man of thirty-two. He had been wearing -13. After the extraction of the lens, with $+3.5 \supset +4.5$ 165° $V = \frac{15}{40}$. In the second case, a woman of forty-five years had vision of $\frac{20}{50}$ without glasses in an eye from which the lens had been extracted at thirteen years; a $+2$ slightly improved it; with $+5$ she read "brilliant" type at twelve inches. BURNETT.

XVII.—VITREOUS.

623. POLLOCK. A case of peculiar punctate opacity of the vitreous. *Beiträge z. Augenheilk.*, xxiv., p. 83.

624. BICKERTON, T. H. The advantages of Mules's operation of evisceration with insertion of artificial vitreous over enucleation of the eyeball. *Brit. Med. Journ.*, Sept., 1896, p. 813.

625. CLAIBORNE, J. H. Some experiments on rabbits made with a view to obtaining a stump for the accurate fitting of glass eyes. *Journ. Amer. Med. Assoc.*, Nov. 21, 1896.

BICKERTON (624) deals in an extensive paper with this subject. He considers the operation most satisfactory, having performed it forty times, but only twenty-four are carefully recorded. In five cases only was the glass globe extruded. Probably the best thing to do in these cases is to pare the edges of the wound and put in a smaller ball. Chromised gut is used for sutures. To control the reaction, no bandage is applied, but iced perchloride of mercury solution, sometimes with lead and opium.

Mr. Juler attributes the escape of the glass globe to its being too large.

[Here in Dublin the operation is constantly performed with very good results. Silk sutures are used, and left in permanently without causing any irritation. Escape of the globe seems to be due either to too large a globe being used, or to imperfect adaptation of the edges of the scleral wound.—L. W.] WERNER.

In 1889, CLAIBORNE (625) made experiments with sponge and cotton as a filling for the cavity of the eye after evisceration, but they were not satisfactory. Later he experimented with glass, wool, and asbestos as a filling, but found that they were not tolerated by rabbits any better than the sponge or cotton. On the whole he deems the ordinary enucleation the safest and best method yet devised of dealing with eyes that require removal.

BURNETT.

XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

626. FUCHS. On erythropsia. *Graefe's Archiv*, xlii., 4, p. 206.

627. BIONDI. The pathological changes in the retina in pernicious anæmia. *Arch. f. Augenheilk.*, xxxiii., supplementary number, p. 83.

628. HIPPEL, E. On degeneration of the retina from iron splinters, with remarks on magnet extraction. *Graefe's Archiv*, xlii., 4, p. 152.

628 A. BERGER. Amblyopia and amaurosis of the circumpapillary zone of the retina. *Arch. d'opht.*, xvi., p. 672.

629. HIRSCH. On the pathology of embolism of the retinal arteries. *Arch. f. Augenheilk.*, xxxiii., supplementary number, p. 139.

630. AXENFELD. On thrombosis of the retinal and choroidal veins in general sepsis. *Aerzt. Verein* zu Marburg, 1896.

631. SIMON. Affections of the retinal veins as the cause of hemorrhage into the retina and vitreous in young persons. *Centralbl. f. prakt. Augenheilk.*, xx., p. 325.

632. PURTSCHER. On spontaneous connective-tissue formation in the retina and vitreous (retinitis proliferans), with a consideration of the etiology of hemorrhagic glaucoma. *Arch. f. Augenheilk.*, xxxiii., supplementary number, p. 1.

633. NUEL. On the pathology of detachment of the retina *Arch. d'opht.*, xvi., No. 10.

634. SIMI. A case of detachment of the retina through metastasis. *Boll. d'ocul.*, xviii., 77.

635. GOSETTI. Detachment of the retina and its treatment by injecting rabbit's vitreous into the vitreous chamber. A clinical conference. Venice, 1896.

636. USSHER. Observations on the retinal blood stream at the time of death. *Ophth. Rev.*, xv., p. 339.

637. WRAY. The treatment of detached retina. *Trans. Ophth. Soc. U. K.*, xvi., p. 63.

638. COLLINS, E. TREACHER. On the origin of ruptures in detached retina. *Ibid.*

639. EVE, F. Detachment of the retina treated by drainage. *Ibid.*, p. 76.

640. SNELL. On the employment of electrolysis in the treatment of detached retina. *Ibid.*, p. 72.

641. JULER. Six cases illustrative of interesting changes in the retina. *Brit. Med. Journ.*, Sept. 26, 1896.

642. MONTGOMERY, W. T. Electrolysis in the treatment of detached retina. *Journ. Amer. Med. Assoc.*, Sept. 26, 1896.

643. RANDOLPH. The anatomic changes in two cases of retinal detachment. *Ibid.*, Oct. 3, 1896.

644. REIK. Etiologic factors other than myopia in the production of retinal detachment. *Ibid.*

645. WOOD, CASEY A. Treatment of detachment of the retina. *Ibid.*

646. MILLIKEN, B. L. Three cases of detachment of the retina in the same family. *Annals of Ophth. and Otol.*, Oct., 1896.

647. BELT. A case of alcohol-tobacco amblyopia with retinal hemorrhage associated with peripheral multiple neuritis. *Ibid.*

In a comprehensive and highly interesting paper FUCHS (626) gives first a historical sketch of the literature of erythropsia, and states that the most various conditions have been described under this name, among them such as religious frenzy and the aura of epilepsy. He then takes up the cases in which the pupils are dilated or the lens absent, the erythropsia here being due to external causes, such as dazzling and the like. In normal eyes the glare from the snow brings about an erythropsia best observed on entering a dimly lighted room. Erythropsia appears either when an unusual amount of light reaches the retina or when the retina reacts abnormally to light, as in conditions of excitement. General disturbances, pregnancy, etc., also dispose to erythropsia. The actual hue of objects is recognized through the red shimmer, except in the case of green, which is blotted out or only appears gray. The subjective color is really a purple, and is mostly seen with one eye, but sometimes with two. Views differ as to the seat of the lesion. Fuchs regards it as peripheral. In the experimental part of the paper he shows that erythropsia is a physiological phenomenon which probably can be called forth in every eye. The pathological cases are distinguished by the fact of the phenomenon being more intense and of longer duration. A normal eye, dazzled by light from the snow, at first sees green in a dimly lighted room and after fifteen seconds red. The periphery is more affected than the centre. Experiments in which different colored glasses were held before the eye showed that the color tone of the erythropsia is independent of the color of the light producing it. Red glass hindered less than any other the development of erythropsia. Experiments were made on abnormal eyes also : (a) in aphakic eyes, walking unprotected in bright light brought about erythropsia not preceded by the sensation of green ; (b) in eyes having a lens but being color-blind, red was seen ; (c) most aphakic eyes were found to have a low degree of erythropsia when the color sense was tested. Experiments in regard to the light sense of aphakic eyes were made. Since the lens absorbs chiefly the ultra-violet rays, the light impinging upon the retina is poor in such rays. In aphakic eyes the ultra-violet rays reach the retina and produce subjective color-sensations and a sense of dazzling. Daylight is red, the snow has a violet color, and daylight reflected from the snow is therefore richer in the short-waved violet rays. The sensation of green coming on before the erythropsia may be regarded as the complementary after-image of the light reflected from the snow, and the erythropsia as the after-image of the same color. Since these phenomena appear only after the continued action of a dazzling light, Fuchs would distinguish them from the ordinary after-images. These images after dazzling can be explained through changes in the visual substance or through the becoming visible of the visual purple. Which of these two explanations is the correct one, cannot yet be said.

Biondi (627) comes to the following conclusions. The retinal hemorrhages which are always present in pernicious anæmia may involve several layers or even the entire thickness of the retina. The nerve-fibre and the outer reticular layers are those more frequently affected. The hemorrhages vary in size from pin-point up to those broader than the disc. The light points in the centre of the hemorrhages are due partly to varicose or ganglionic degeneration of the nerve fibres, partly to globular hyaline masses. The nerve fibres always exhibit varicose hypertrophies and ganglionic degeneration. The walls of the smaller vessels are diseased. The diagnosis "retinal hemorrhages" seems more fitting than "retinitis hemorrhagica."

HIPPEL (628) examined anatomically an eye destroyed through injury with a splinter of iron. The diagnosis was : total atrophy of the muscular structure of the iris and partial of the ciliary body, sclerosis and retraction of the ciliary processes, total absorption of the lens, marked shrinking of the vitreous, slight chronic choroiditis, total degeneration of the undetached retina, with consecutive atrophy of the optic nerve ; siderosis of the iris, pigment epithelium, pars ciliaris retinæ and retina, delicate new membranes about the foreign body. The degeneration of the retina from the chemical action of the iron was the cause of the total blindness. A number of cases are cited in which an iron splinter in the eye was well borne and caused no detachment of the retina, and a number also in which later a fresh inflammation came on and the retina became detached. No reason is known why the degeneration of the retina should come on in some cases and be absent in others.

BERGER (628A) recommends that, in taking the visual field, the blind spot and the neighboring region be examined. Since the circumpapillary fibres here involved run just beneath the pial sheath, a perineuritis reveals itself, above all, by the enlargement of the blind spot, or the existence about the latter of an amblyopic zone. The author shows, by a number of cases of sympathetic neuritis, retrobulbar neuritis, and tabic atrophy, the importance of such examination. In the last-named disease, enlargement of the blind spot, and circumpapillary amblyopia, render the prognosis bad, and indicate a rapid course. In intoxication amblyopias, this defect in the field was also found passing over into the central scotoma. In optic-nerve atrophy due to arterio-sclerosis, it was seen in cases in which it could not be referred to changes in the retina. Enlargement of the blind spot, varying at different examinations, was found in neurasthenics, and may possibly, by the difficulty in orientation which it causes, explain agoraphobia. v. MITTELSTÄDT.

HIRSCH (629) reports a case of embolism of a branch that had the ophthalmoscopic picture of a cilio-retinal artery, but there are others in which no vessel of that appearance is found, and therefore he believes that this region of the retina is supplied by a particular branch of the central artery of the retina (as do most recent writers on the subject). He supposes the blood supply of the retina to be distributed to three distinct regions : one supplied by the upper branch of the central artery, a second supplied by the lower branch of the central artery, and a third, a papillo-macular triangular region, supplied by the smaller branches of the central artery. The macula, he believes, is supplied by all three, and hence central vision is abolished only when all three branches are involved, or the central artery is obstructed low down.

AXENFELD (630) speaks of the establishment of collateral circulation after thrombosis of the central vein, through the medium of the already existing capillary connections. In consequence of this, the disturbances of vision are not such as are indicated by the ophthalmoscopic picture. In cases of unilateral independent thrombosis, one usually finds arterio-sclerosis and cardiac lesions, so that Michel regards the process as marantic. Still, there must be a special disposition of the central vein in the region of the lamina cribrosa, since venous thromboses have not been seen elsewhere at the same time. That true marantic thrombosis may occur is shown by the following case : A man with hemorrhagic sepsis, with extensive hemorrhages in the retina without signs of stasis, showed quite fresh mural thrombosis in the right central vein, two capillaries of the right eye had hyaline thrombi, and several choroidal veins had fresh thrombi, a state not previously described.

SIMON'S (631) patient, an otherwise healthy man of twenty-one, who suffered from recurrent hemorrhage into the vitreous, had normal retinal arteries, but marked venous changes. The veins exhibited white sheaths (perivasculitis), and were from time to time concealed by small round or elongated grayish exudations. The latter soon disappeared, and were mostly the forerunners of retinal hemorrhage.

PURTSCHER'S (632) conclusions as to retinitis proliferans are as follows : There is a formation of connective tissue in the retina and vitreous referred to hemorrhage, traumatic or spontaneous, the latter variety due to a pathological condition of the circulatory apparatus, or of the retinal vessels themselves. In this condition we have to consider, on the one hand, direct products of the transformation of hemorrhages, and, on the other, the products of a retinal inflammation due to reaction. In the second place, there is a connective-tissue proliferation in the retina as a result of a peculiar vascular disease, as the product of a retinitis in the sense of Manz, who first described the condition. Hemorrhages accompany this latter affection, but only incidentally, and to it alone belongs the name retinitis proliferans. Secondary glaucoma may arise in the affected eye as a result of the vascular disease.

USSHER (636) describes in an interesting paper the changes observed just before and after death, in six patients and also in monkeys, cats, and rabbits. In the human beings, just at the last gasp, the blood was seen to become at first finely and then coarsely granular, and the blood was observed to flow towards the optic disc even in the arteries. Later on, the beaded appearance due to breaking up of the blood column, and which has been described by previous observers, took place. Cats are more suitable for examination than the other animals, as the media in them remain clearer. The granular appearance and visible movement occur before the heart ceases to beat, and life may still be restored during this phase.

In order to determine the influence of the intra-ocular tension, the anterior chamber was tapped, but it was found necessary to remove the cornea to obtain a clear view. When this was done, the blood became granular, but no visible movement or beading occurred, and the vessels did not empty themselves. Increasing the tension by injecting a saline solution into the vitreous caused visible movements in both arteries and veins. In human beings after death Ussher has never seen the arteries empty themselves in the direction of their current, but always in the opposite direction. The granular appearance is due to the slowness of the current allowing blood corpuscles and collections of blood corpuscles to become visible. WERNER.

WRAY (637) first describes the different methods of treatment which have been adopted. He performed scleral puncture frequently and never saw the least reaction. One case was exhibited in which the operation had effected complete reapposition of the retina. Vision improved from counting fingers at 3 metres to $\frac{6}{36}$, and remained so when seen seven months later.

Dr. Little had seen two complete recoveries after the operation. A successful case of Mr. Tweedy's was also alluded to. Mr. Wray in reply stated that he had elicited the fact that the operation was safe. WERNER.

Collins (638) describes the views of Von Graefe, De Wecker, Nordenson, Raehlmann, as to the causes of retinal detachment and ruptures, and reports two cases in which microscopic examination supported Elschnig's theory as to the cause of ruptures in retinal detachments. In each case a small portion of retina remained attached in the yellow-spot region to which it was adherent, having been torn off the detached portion, owing to choroiditic adhesions. Whenever an eye is cut open, the edges of the retina turn in, hence the fact that the edges turn in in ruptures is of no importance as evidence for or against any particular theory. Werner.

Eve's (639) patient had a large detachment of the retina in the left eye R E V = $\frac{6}{6}$ with − 1. D. The detachment was treated by scleral puncture and insertion of a bundle of horse-hair. V improved from p. l. to $\frac{6}{24}$. Two months later field normal, no detachment. V = $\frac{6}{36}$. Werner.

Snell (640) had, on the whole, found puncture of the sclerotic the most satisfactory method of dealing with detached retina. He records three cases treated by electrolysis according to Terson's method, using a platino-iridium needle at the positive pole with a current of 5 milliampères. The first case was one of old and extensive detachment and no result was obtained. In the second the detachment was diminished and V rose from fingers to $\frac{6}{24}$ and remained so four months later. In the third case the retina became replaced but V only rose to $\frac{15}{100}$ with + 4. Werner.

Juler (641) showed six microscopic specimens. Case I. *Retinal Apoplexy.*—The whole thickness of the retina was infiltrated with blood, but none escaped into the vitreous. No inflammation. Patient aet. thirty-nine, with valvular disease and acute nephritis. Acute glaucoma supervened. Case II. *Glioma Endophyton.*—A girl æt. six years. Yellowish mass seen by oblique illumination behind lens. Ant. ch. shallow. Tn. Left eye normal; no recurrence nine months after enucleation. The glioma infiltrated the whole retina up to but not beyond the ora serrata. Nerve layer most involved. Iridic angle free. Case III. *Glioma Exophyton.* Boy aged two and a half years. Brilliant yellow reflex behind lens. T+. Iridic angle was seen in specimen to be closed. Retina detached, outer surface nodular especially towards the nerve. Case IV. *Choroido-Retinal Atrophy.* Case V. *Peculiar Retinal Growth Simulating Glioma.* The growth was intraretinal and fibrous, probably the result of hemorrhage. An orbital tumor supposed to be a secondary growth turned out to be a dermoid cyst. Case VI. *Ciliary Staphyloma*, choroido-retinal atrophy, deep cup. WERNER.

From an experience of four cases of detachment of the retina treated by electrolysis, MONTGOMERY (642) concludes that the treatment is exceedingly painful, but not immediately followed by severe reaction ; that it is valueless as a corrective agent in the treatment of detachment ; and that it may be a factor in exciting inflammatory glaucoma. BURNETT.

RANDOLPH (643) gives the histories of two cases of detachment of the retina which he had examined histologically. There was widespread degeneration of the retinal layers, and especially the layer of rods and cones. The granular layers were usually preserved, and there was swelling of Müller's fibres. But the most striking anatomic change was the fibrillary degeneration of the vitreous body, and which he considers the chief element in the pathogenesis of the disease. There are two figures representing these conditions in the paper, as published in the *Johns Hopkins Hospital Bull.*, for Sept.–Oct., 1896. BURNETT.

After a consideration of the various theories advanced for the cause of retinal detachment, aside from high degrees of myopia, and the facts on which they are based, REIK (644) thinks that it is probably safe to say that the vitreous is always the seat of pathologic alterations, though such changes may not be and often are not apparent by ophthalmoscopic examination. BURNETT.

After a review of the whole subject and the various plans that have been proposed for the treatment of retinal detachment, WOOD (645) concludes that we have discovered no better system than that followed by the older ophthalmologists, viz : rest in bed, bandages, atropine, and the internal use of some absorbent. He advises to substitute soda bicarbonate and potass iodid for pilocarpine when the latter disagrees. Puncture in recent cases may do a temporary good. BURNETT.

MILLIKEN (646) gives the histories of three cases of detachment of the retina, in three brothers, coming on after middle life ; all in the right eye,—the left being unaffected,—all being in tolerably fair health and with no family history of serious disease ; the detachments all being in the same part of the backgrounds the upper-outer portion. In only one was there any myopia, 4.5. Treatment was of no avail in arresting the spread of the detachment. BURNETT.

Belt's (647) patient was a man of thirty-five years, a heavy drinker, who smoked about 15 cigars a day. Was hardly able to walk on account of multiple neuritis. Has some astigmatism, but vision not much impaired. Some two months later, when called to see him, after an attack of delirium tremens, V was reduced to $\frac{6}{200}$ in each eye, and an extensive retinal hemorrhage in the right eye, locality not stated. Retinal veins full. Alcohol and tobacco stopped, increasing doses of strychnia were given, and in a month vision was restored to the normal. Burnett.

XIX.—OPTIC NERVE.

648. Parinaud. Retrobulbar neuritis and the paths of infection of the nervous system. *Jour. de med. et de chir.*, July, 1896.

649. Dean, George, and Ussher, C. H. Experimental research on the course of the optic fibres. (Preliminary communication.)

650. Ellis, H. B. A case of total blindness possibly due to an overdose of quinine. *Journ. Amer. Med. Assoc.*, Nov. 7, 1896.

651. De Schweinitz. Optic-nerve atrophy from toxic agents. *Ibid.*, Oct. 31, 1896.

652. Short, O. S. Treatment of optic atrophy by mercurial inunctions in conjunction with the hot baths of Hot Springs, Arkansas. *Ibid.*, Dec. 5, 1896.

Parinaud (648) by retrobulbar neuritis understands a peripheric neuritis of the optic nerve as distinguished from an optic neuritis of cerebral origin. The affection in intoxication amblyopias is a systemic, symmetrical degeneration probably dependent upon a disturbance of the visual centre and not to be confused with retrobulbar neuritis proper. These are called, respectively, toxic and infectious retrobulbar neuritis. The infectious form may be acute or chronic, and the path of infection is through the nose and ethmoid or through the orbit. Sulzer.

The authors (649) conducted experiments on rabbits and monkeys, in order to determine the relation of the parts of the retina to those of the optic nerve. The method of operating consisted in dividing the retina with a Graefe's knife passed through the sclerotic just behind the ciliary region, taking antiseptic precautions. The animal was killed about four weeks after the operation. The parts were carefully hardened with Müller's fluid and tained by Marchi's osmium-bichromate method. The eyeballs were divided equatorially and mounted in glycerine jelly, showing the lesions in the retina. The lesions were produced in the neighborhood of the disc. In rabbits a limited degeneration occurred in the optic nerve throughout its whole course, and occupied always the same position in relation to the nerve section in any one nerve, the position of the degeneration being similar in position to the retinal lesion. Incisions across the opaque fibres caused the densest degeneration. Some black points were found in the nerves of the opposite side, which may have been due to fatty matter conducted by the lymphatics to the opposite side, but it may be slight degeneration, as Kellerman found, in a case of optic atrophy, degeneration in the opposite nerve, which he attributed to compression of the nerve fibres in the chiasma, by the shrinking of the fibres, etc., belonging to the atrophic side.

The experiment on a monkey, the lesion being between the papilla and macula, proved more interesting, as the result corresponded exactly with lesions observed in toxic amblyopia. After the authors had written their paper, they discovered that PICK (*Deutsche Akademie der Naturforschr. Bd.*, lxvi., No. 1, 1895) had performed a number of similar experiments on rabbits with the same results as theirs. WERNER.

In ELLIS's (650) case the patient, a man of thirty-four, was an opium and whiskey habitué of quite long standing, taking twenty grains of morphia and from a pint to a quart of whiskey a day. After taking 120 grains of quinine in twenty-four hours in four doses, his vision, which had hitherto been good, failed totally. Vision gradually returned in two weeks, and again, without any ingestion of quinine, failed to simple p. l. Pupils very small, but fundus shows no change beyond some anæmia. BURNETT.

This communication of DE SCHWEINITZ (651) is a general consideration and a review of the literature of toxic amblyopias which he treats under the following heads: 1. Toxic atrophy of the papillo-macular bundle of the optic nerve preceded by inflammation or degenerative changes in this tract and associated with scotoma. 2. Progressive and scotomatous atrophy of the optic nerve, the result of toxic agents. 3. General atrophy of the optic nerve, the result of toxic agents. 4. Atrophy of the optic nerve secondary to retinal and other lesions, in their turn the result of toxic agents. BURNETT.

The conclusions arrived at by SHORT (652) from an experience afforded by forty-one cases are, that those cases of atrophy of the optic nerve where there is only light perception remaining are not benefited by any treatment. If there is still $V = \frac{20}{200}$, we may expect benefit from mercurial inunctions and the hot bath. Unless there is a specific history of mineral poisoning, the iodid of potass. is harmful. Strychnia is good only in cases of spinal origin.

Burnett.

XX.—INJURIES, FOREIGN BODIES (PARASITES).

653. Van Duyse. Endo- (peri-) thelioma, or alveolar perithelial sarcoma of the orbit. *Arch. d'opht.*, xvi., 10, p. 604.

654. Cervera, Torres. A foreign body in the eye. *Ann. d'ocul.*, cxvi., p. 279 (an unusually large splinter of iron).

655. Post, M. H. Removal of a spiculum of glass from the vitreous with preservation of normal vision. *Ophth. Rev.*, xv., p. 311.

656. Alt. A case of rupture of the ligamentum pectinatum, (cyclo-dialysis), irido-dialysis, and dislocation of the lens due to contusion. *Am. Jour. of Ophth.*, Oct., 1896.

657. Hansell. Extraction of a piece of steel from the vitreous by the Hirschberg magnet. *Ibid.*, Dec., 1896.

Van Duyse (653) found a tumor as large as a pea attached to the posterior pole of an eye long blind from injury, which was enucleated for the relief of pain. The patient was a boy of twelve, and the tumor proved to be an endothelial alveolar sarcoma, wherefore exenteration of the orbit was done. The entire tumor, which had developed in the region of the posterior ciliary vessels without involving the optic nerve or sclera, was disc-shaped, 6–7 *mm* broad and 4–5 *mm* thick. It consisted of cells arranged concentrically about capillary vessels, of epithelial appearance, but varying in form and size. In other parts an alveolar structure existed, the groups of cells being separated by connective-tissue membranes so that carcinoma was suggested. This variety of microscopic structure, which is characteristic of endothelioma or angiosarcoma of the orbit, explains the different designations applied to these growths. v. Mittelstädt.

In Post's (655) case the piece of glass perforated the margin of the iris and lens, and projected from the latter into the vitreous. It was removed, after iridectomy, by a cataract scoop, along with a considerable portion of the lens. Two months later $V = \frac{20}{15}$, (patient aged seventeen). Werner.

ALT'S (656) patient was a man of fifty-seven, who received a blow on the eye from a large piece of wood. There were dislocation of the lens and irido-dialysis noted at the time. Sometime subsequently glaucomatous symptoms supervened and the eye was enucleated. It was then found that the ciliary body had also been torn from its attachment by the blow. He considers the plugging up of Schlemm's canal the cause of the glaucomatous outbreak. BURNETT.

The points of interest about HANSELL'S (657) case of extraction of a bit of steel from the vitreous by a Hirschberg magnet are: 1, the length of time, six months, between the accident and the operation; 2, the retraction of the edges of the opening in the sclera to permit the easy exit of the foreign body; and 3, the recovery of vision to $\frac{20}{60}$. BURNETT.

XXI.—OCULAR AFFECTIONS IN GENERAL DISEASES.

658. DENTI. Acromegaly in its relations to the organ of vision. *Ann. di Ottalm.*, xxv., 6, p. 619.

659. LEHMANN. Hemianopsia in puerperal amaurosis. *Berl. klin. Wochenschr.*, No. 51, 1896.

660. SCHIRMER, TH. Subjective sensations of light with complete loss of visual power in the cortex of both occipital lobes. *Inaug. Dissert.*, Marburg, 1896.

661. JOFFRIO. The pathological changes in the retina from phosphorus poisoning. From the laboratory of Prof. Bellarminoff, abstract in *Medicina*, No. 27 and 28, 1896.

662. STRZEMINSKI. Hereditary syphilitic affections in the eyes of the second generation. *Rec. d'opht.*, 1896, No. 602.

663. VAN DEVENTER. A case of multiple sclerosis with blindness in both eyes. *Geneesk. Tydschrift voor Nederlandsch Indie*, xxxvi., p. 332.

664. HOFFMANN. On the simultaneous occurrence of optic-nerve and spinal-cord inflammations. xxi. *Wanderversammlung der südwestd. Neurologen u. Irrenärzte.*

665. WASKRESSENSKY. On the scorbutic affections of the eye. *Wojemo Med. Journ.*, 1896, No. 10.

666. BRÜNNICKE. On apoplectiform hemianopic blindness, with psychic blindness. *Hospitalstidende*, No. 51 and 52, Copenhagen, 1896.

667. Bailey, Pearce. The effect of early optic atrophy upon the course of locomotor ataxia. *Med. Record*, Nov. 14, 1896.

668. Sheffield, H. B. A case of chorea minor involving also the ciliary muscle. *Amer. Medico-Surgical Bulletin*, Nov. 14, 1896.

669. Ayres, C. S. A case of chloroma. *Journ. Amer. Med. Assoc.*, No. 7, 1896.

670. Friedenwald. Affections of the eye and normal menstruation. *Journ. of Eye, Ear, and Throat Diseases*, Oct., 1896.

Denti (658) followed the eye symptoms in a case of acromegaly from their inception to the development of bilateral atrophy of the optic nerves. The gradual failure of vision, the contraction of the field, and the disturbances of circulation in the disc proved that there must have been pressure on the chiasm from the enlarged hypophysis cerebri, as has been found in other cases of this strange disease. Dantone.

Lehmann (659) reports a case, which, like the four cases described by Pick, confirms Graefe's view that uræmic amaurosis was due to an affection of the cortex. It was a case of hemianopsia in puerperal amaurosis, although the amaurosis was not due to uræmia, but was rather the form which is a symptom accompanying or preceding eclampsia. A woman in good health during her ninth pregnancy, except for some occipital headache. Labor normal. Twelve hours after, a left hemianopsia developed. Fundus normal. Small amount of albumen in the urine. The following day amaurosis, but two days later vision restored except in a small central field. Pupillary reaction and fundus normal. Four days later vision normal, and fourteen days later no albumen. The remarkable feature in this case was that, with eclamptic amaurosis, as the author terms it, convulsions and disturbances of consciousness were absent. Amaurosis from anæmia was excluded, as was also amaurosis from uræmia on account of the small quantity and short duration of albumen in the urine, while the tense pulse, the albuminuria, and the continued headache favored the idea of an eclamptic symptom, even if not a typical one.

Schirmer (660) records the case of a hard drinker of seventy-four who became suddenly blind after short prodromal symptoms. Ophthalmoscopic appearance normal. At the moment of blinding he seemed to see fire. There were found extensive destructive changes in the right occipital lobe, and a softening of the entire left lingual lobule. The subjective visual perception at the moment of the affection was supposed to mean that the sudden excitation of the cerebral cortex by the circulatory disturbance produced a sensation of light which was projected outward.

Joffrio (661) found in his experiments that all cases of phosphorus poisoning could be divided into three groups:

1. Acute poisoning. The microscopic examination shows congestion of the retinal and choroidal vessels, slight infiltration of the ganglion-cell and nerve-fibre layers with mononuclear leucocytes, particularly near the posterior pole. Ophthalmoscopically, hyperæmia of the fundus.

2. Subchronic poisoning. The nerve-fibre and ganglion-cell layers are infiltrated with leucocytes. The rod-and-cone layer is in a state of degeneration, and at points is detached from the outer nuclear layer. The choroidal and retinal vessels are congested. Diapedesis from many retinal vessels. Some fibrinous exudation in the subretinal space. Ophthalmoscopically, marked hyperæmia of the fundus.

3. Chronic poisoning (the dogs having lived from thirteen to twenty-three days). Microscopically, marked infiltration of the nerve-fibre and ganglion-cell layers and the disc with mononuclear leucocytes; also some scattered leucocytes in the vitreous. The ganglion cells are much enlarged, and some are shrunken and contain small vacuoles. The entire rod-and-cone layer is detached and degenerated. The retinal epithelium is loosened at various points, and here the cells are enlarged and contain fat.

The disc is swollen; there are extravasations in the nerve-fibre layer; marked diapedesis; thickening of the arterial walls in the retina and iris. The choroidal vessels are so congested that the choroid resembles the corpus cavernosum. The limitans externa is separated from the outer nuclear layer, and forms an undulating surface. The ophthalmoscopic picture was the same as that in group 2. Hirschmann.

Strzeminski (662), in two children whose father had hereditary syphilis, found bilateral interstitial keratitis and small circumpapillary patches of chorio-retinitis with punctate opacities of the vitreous. He believed the affection to be hereditary syphilitic of the second generation and supports this diagnosis as follows.

1. The father had hereditary syphilis, having never acquired the disease, the mother is healthy.

2. The children suffer from an eye affection similar to that seen in patients of the first generation with hereditary syphilis.

3. All other etiological factors can be excluded.

4. The evident favorable influence of mercurial treatment indicated the syphilitic nature of the affection. SULZER.

HOFFMANN (664) reports two cases of blindness and paralysis of the legs. At the autopsy there was found a disseminate myelitis in the dorsal portion and a retro-bulbar optic neuritis. In the second case, that of a woman of sixty-five, there was transverse dorsal myelitis and marked optic neuritis. Cold, trauma, infectious diseases, gout, etc., are supposed to be etiological factors. The neuritis may appear before, with, or after the myelitis. The disease is a disseminate focal inflammation, and the term "encephalo-myelitis disseminata" is appropriate.

WASKRESSENSKY (665) gives the following characteristics of the scorbutic eye. At first the sclera is copper-red, and there are extravasations in the conjunctiva, particularly the bulbar portion, distinguished from ordinary extravasations by their dark red, almost brown color. The affection lasts for a month or six weeks, the cornea and vision remaining normal. At times the iris is affected, but the eye is not damaged. HIRSCHMANN.

BRÜNNICKE (666) records three cases of blindness having a hemianopic character following repeated apoplexies. In two of these cases psychic blindness existed and the power of orientation was lost. SCHIÖTZ.

As a result of the examination of a large number of histories and of twelve case which he reports in more or less detail, BAILEY (667) arrives at the conclusion that, in about 75 % of cases of tabes in which optic atrophy is an early symptom, some of the tabic symptoms may be late in appearing or may not develop at all. But the most distressing symptoms may develop simultaneously with or immediately succeed the blindness. No prognostic significance attaches to the association of the atrophy with oculo-motor paralyses. BURNETT.

The case that SHEFFIELD (668) reports has nothing to show in its history that the ciliary muscle was affected, as no record is given of the state of the accommodation. The title therefore is misleading. There was, however, an intermittent variation of the pupil in size from a pin's head to the fullest extent of dilatation several times a minute. The patient was a girl of ten years and was suffering from a pronounced chorea minor. On the cure of the chorea the eye symptoms disappeared. BURNETT.

Ayres (669) reports a case of double exophthalmus in a boy of seven years, due to tumors in the orbits. These tumors were of rapid growth, only two months elapsing between the time of first appearance and the death of the patient. There was marked leucocytosis, if not genuine leukæmia. A post-mortem examination showed the orbits to be filled with a greenish soft mass, which also invaded the cancellated tissue of the sphenoid and petrous bones. The tissue was homogenous and without septa. The substance of the tumor consisted of small round cells, none or very few spindle cells, and scant intercellular substance. There had been what was supposed to be a parotitis just previous to the attack, and the lymphatic glands were involved extensively. Deafness was also a pronounced symptom. Death occurred as a result of hemorrhage from the conjunctiva of the right eye.

Burnett.

Friedenwald (670) describes cases of eye trouble in connection with menstruation : among others, one similar to the keratitis punctata superficialis of Fuchs, and some of herpes corneæ ; one case of recurrent conjunctivitis ; one of iritis ; and two of hemorrhage into the vitreous. Burnett.

BOOK REVIEWS.

I.—**Sight:** an Exposition of the Principles of Monocular and Binocular Vision. By JOSEPH LE CONTE, LL.D. D. Appleton & Co., 1897.

All who are interested in the study of physiological optics will welcome this new edition of Professor Le Conte's book. There is perhaps no treatise of the same compass which gives so clear an account of the fundamental phenomena of monocular and binocular vision, and which is at the same time so suggestive and so original. Even those that are well grounded in the optical works of Donders and Helmholtz will gain by a thorough reading of this little book and by repeating for themselves the numerous original experiments that it contains.

The ophthalmologist will probably skip the first fifty-eight pages relating to the structure of the eye and to its refractive errors, but he will do well not to skip the next section on Space-Perception, including the explanation and proof of the laws of external projection and of direction, with numerous ingenious experiments, and remarks upon erect vision, the blind spot, etc. Section III. of this chapter is largely new, and gives a fair account of the theories of color-vision (including Mrs. Franklin's theory) and of the kind of sight possessed by the color-blind.

With Part II. (Binocular Vision) opens up the really original part of the work. The author's acute observations, and his clear presentation of the many intricate phases of this highly involved subject, are worthy of all praise. Particularly is this the case with his treatment of the question of binocular perspective (Chapters IV. and V.), in which he convincingly states what appears to us to be the true explanation of our notions of depth and solidity —an explanation opposed to some theories still more or less current.

Those who have read the previous edition will doubtless turn first to Part III., in which he treats of the laws of ocular motion and explains, in a way that to those used to the demonstrations of less perspicuous authors seems surprisingly simple, the laws governing wheel-rotation in parallel and convergent movements, and the horopter. In this edition he has seen no occasion to modify the views expressed in the first, in which he combated Helmholtz's ideas both as regards Listing's law and the horopter ; returning, as far as Listing's law is concerned, to Donders's original explanation. To us, at least, his arguments seem irrefragable ; and the more so because of the independent anatomical and clinical evidence supporting Donders's and opposing Helmholtz's statement of the facts.

Interesting chapters on Some Phenomena of Binocular Vision usually overlooked, Visual Phenomena in Ocular Divergence, the Comparative Physiology of Binocular Vision, and the Evolution of the Eye (in invertebrates and vertebrates) close the work.

A. D.

II.—**System of Diseases of the Eye.** Edited by WILLIAM F. NORRIS, A.M., M.D., and CHARLES A. OLIVER, A.M., M.D. Volume II., Examination of the Eye, School Hygiene, Statistics of Blindness, and Antiseptics. Pp. 556, octavo, with 13 full-page plates and 214 text illustrations. Philadelphia : J. B. Lippincott Company, 1897.

This second volume is, on the whole, quite up to the high standard of the first, already noticed in these pages, and is perhaps intrinsically more valuable than the first because many of its papers deal with matters of recent investigation which have not been so fully treated of in earlier text-books.

The papers on acuteness of vision, 11 pages, by Snellen ; on mydriatics and myotics, 20 pages, by H. Snellen, Jr. ; on lateral illumination, 16 pages, by Laqueur ; on ophthalmoscopy, 26 pages, by Gould ; on skiascopy, 22 pages, by Jackson ; and on the balance of the extra-ocular muscles, 22 pages, by Stevens, are all clearly written, complete, and properly illustrated.

The paper on ophthalmometry, 30 pages, by Adolph Javal, Jr., is particularly good. It is systematically divided into sections, and the subject is treated adequately, yet in a simple and lucid manner. The author offers only such mathematical demonstrations as are necessary to explain the principles involved in measuring the surfaces of the cornea and lens ; and the value of the ophthalmometer and the importance of its findings are not proclaimed in the intemperate language to which we have been accustomed.

Prismometry is treated of by Dennett in a paper of 26 pages without a break or sub-title. The author appears to have taken a relatively unimportant subject very seriously, and his paper bristles with trigonometrical formulæ and tables. This, while well enough in its way, is hardly in keeping with the practical character of the volume, particularly since there is no reason why all that there is in the subject of value or interest to the ophthalmologist might not have been presented in a more comprehensible manner. It may be well enough for the author to say, without any readily discoverable connection with what has gone before or follows: "It is a well-known fact that if the radiant is in the denser medium the rays become the normals to an ellipse, but if it is in the rarer medium they become the normals to an hyperbola." Yet one might venture to assert that this will not be recognized as a well-known fact by 95 per cent. of the readers for whom this work is intended, nor will they be eager to have it told them.

Prisms may be designated, we are informed, by the refracting angle system, the angle of deviation system, the centrad system, the prism-diopter system, and the meter-angle system. Certainly no one will object to all these systems being described, but as three of them have not shown signs of surviving, it would seem superfluous to work out each table and formula for all five, as the author has done throughout.

Digressions into the discussion of problems which have interested the author as a mathematician and physicist, but which do not interest the ophthalmologist, and are, therefore, out of place in this paper, are only too frequent. On page 162 we meet with the following passage: "The resolution of the circular motion into its vertical and horizontal harmonic components enables us to show at a glance, or calculate with precision, just how much of the displacement caused by a prism in any position is corrected by the horizontal, and how much by the vertical, muscles. . . . What part is played by each of the four recti muscles in adjusting the right eye to a prism of 8^d, whose apex is, as placed in the trial frame, at 85° 30′, the degree marks on the frame being numbered counter-clockwise from the insertion of the internal rectus? Below is given the result of multiplying the cosine of the angular distance of the insertion of each muscle from the prism's apex by the number of the prism." The part played by the superior rectus, for example, he finds to be 7.75^d. Now all this would be of no possible interest to the ophthalmologist, even if it was true; but the movements of the eye are not performed in any such simple way as the author indicates, and when the obliques are equally taken into account, as they should be, computations of this sort become manifestly impossible. What the author has really obtained is not the part played by each rectus in overcoming the effect of the prism, but merely the vertical and horizontal components of the rotation of the eyeball; which also is of no interest. Furthermore, the author's manner of expressing himself is involved. His style is not lucid. In fact he seems to delight in rendering his pages purposely obscure to a degree which makes them unintelligible to the ordinary reader. For what other reason, one may ask, could a self-evident statement be followed with an incomprehensible explanation, as in this sentence (still p. 162): "Thus, when the apex is vertical, the prism has no effect on the right internal rectus, because, as the apex is turned clockwise, the sine of the angle through which it has turned is the fractional part of the deviation which must be corrected by the internal rectus."

The longest and most important paper in the book is that on perimetry, 125 pages, by Wilbrand. It is a detailed and exhaustive account of the subject from the clinician's point of view, and is perhaps the best that has been written, even if it is not everywhere entirely up to date. The translator started out well, and much of the translation is excellently done, but he seems to have wearied of his work from time to time, and to have fallen into habits of carelessness which lead to no little obscurity and confusion. Descriptive terms are loosely applied, certain words are used where others were intended, and the diction in places is crude in the extreme. Considerable ambiguity is caused by using the expression "optic tract" to designate both the optic tract proper and also the entire course of the nerve fibres from the retina to the subcortical optic ganglia; by using "neurotic atrophy" for post-neuritic atrophy; and the like. Within the limits of a page can be found "arteria corpora callosi," "unilateral" where the author doubtless wrote "bilateral," and the following bit of careless writing: "Often the presence of an involvement of one or more of the nerves of the base of the brain is present." The presence is present, and "of" used five times in a sentence of twenty-one words! showing that the translator is free from the morbid sensibility of Flaubert, "who," so Gautier said, "is tortured by a remorse that poisons his life: it is that of having heaped two genitives upon each other in *Madame Bovary*."

The papers on the detection of color-blindness, 38 pages, by Thompson and Weiland; on the causes and prevention of blindness, 44 pages, by I. Minis Hays; and on antisepsis, 26 pages, by Andrews, are all good. The paper on school hygiene, 66 pages, by Risley, is particularly timely, and will be welcomed by medical inspectors of schools, as being of great practical value; the illustrations, however, are very miscellaneous.

The concluding paper, 50 pages, by McFarland and Kneass, on the micro-organisms of the conjunctiva and lachrymal sac, comprises a description of some forty micro-organisms with about forty illustrations of cultures of non-pathogenic micro-organisms that have been found on the conjunctiva. Were not its presence explained by the authors, the reader might wonder at finding a paper here which would seem to be suitable only for a reference book of bacteriology. The authors' explanation appears in the following sentences: "It is, however, deplorable that so many ophthalmologists have hurried into the bacteriological study of cases with so incomplete a knowledge of the subject as to render their work not only valueless, but worse than that, an obstacle in the way of others." "The editors of this work conceived that one source of the bacteriological errors made by ophthalmologists depended upon the insufficient data with which they were furnished, and deemed it advisable to enter in their system this paper, which should comprise as complete a catalogue as possible of the bacteria which have been found upon the conjunctiva and in the lachrymal apparatus, etc."

The truly altruistic spirit in which this paper is conceived and its laudable purpose that hereafter the erring ophthalmologist shall have no excuse for doing bacteriological work that will be an obstacle in the way of others, will surely earn the gratitude of those who are in the habit of doing such work and for whose benefit the paper is intended; still, to ophthalmologists in general, we are not convinced that the greater part of this paper is of any particular interest, or that its value in a work on ophthalmology is at all commensurate to its length.

If our knowledge of the micro-organisms found on the conjunctiva was reasonably complete, a descriptive catalogue would be useful for reference, and might properly have a place in a volume intended to be of more than transient value. But the list is growing from year to year, and the catalogue given here is not complete even at its time of publication. For example, there is no mention of the diplo-bacillus described independently by Morax and by Axenfeld as being found in the secretion of conjunctivitis, nor of a coccus found by Bach in similar secretion, nor of the well-known xerosis bacillus whose possible identity with the pseudo-diphtheria bacillus is now a matter of general discussion, nor even of actinomyces under its own name; yet some of these micro-organisms have been familiar to the ophthalmologist for years.

With the exception of a few points, such as those mentioned above, which seem to call for adverse criticism, the volume as a whole can be heartily commended; and the errors it contains are rarely errors of fact but rather, as it seems to us, errors of judgment in respect to the matter introduced aud the manner of its treatment.

W. A. H.

Contents of the last three numbers of the Archiv für Augenheilkunde.

Vol. XXXIV., No. 3 (8 plates and 3 text-figures). Issued March, 1897.

XII. Rumschewitsch. On the pathological anatomy of spontaneous luxation of the lens into the anterior chamber.

XIII. Salzmann. The decrease in refraction caused by removing the lens.

XIV. Schmidt. On a case of papillo-retinitis with chlorosis.

XV. Fridenberg. On the pathology of hemorrhagic glaucoma.

XVI. Ritter. A contribution to the subject of the development of the lens.

XVII. Dolganoff. On the ocular changes following ligation of the gall bladder.

XVIII. Süsskind. Clinical and anatomical contribution to tuberculosis of the lachrymal gland.

XIX. Heinersdorff. A case of bilateral non-inflammatory glaucoma in a young person with retinitis pigmentosa and myopia.

XX. The original articles of the English edition, Vol. xxv., Nos. 2 and 3. Abstracts by R. Greeff.

Vol. XXXIV., No. 4 (1 plate).

XXI. Bach and Neumann. Purulent keratitis in man. A bacteriological and clinical study.

XXII. Landolt. The graduation of the squint operation. Translated in No. 1, of the present volume.

Dunn. A further peculiar case of retinal striations. Appearing in this number.

Systematic report on the progress of ophthalmology during the fourth quarter of 1896. Translation in this number.

Vol. XXXV., No. 1 (2 plates and 2 text-figures). Issued July, 1897.

I. Pergens. Buphthalmus with lenticonus posterior.

II. Neese. A case of angioma orbitæ fibrosum.

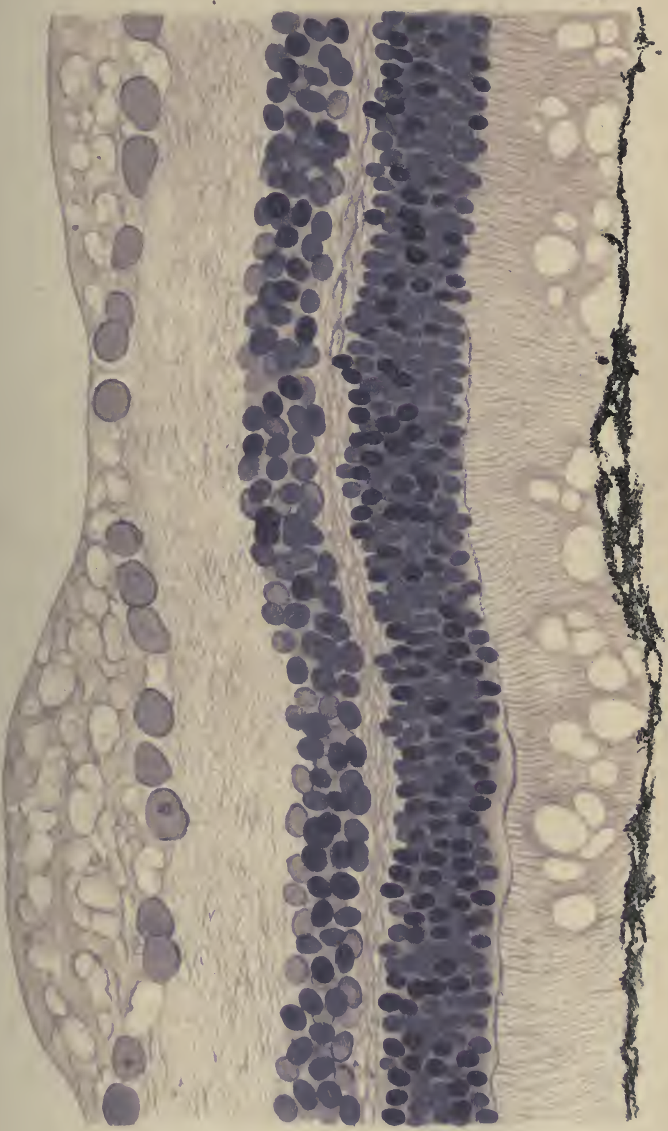
III. Walter. On accommodation in aphakia.

IV. Guillery. Conception and measurement of central acuteness of vision on a physiological basis.

V. Gruber. Physical studies on ocular pressure and tension.

VI. Klingelhöffer. The extirpation of an orbital cyst (cephalocele) by means of temporary resection of the orbital wall after Krönlein's method.

VII. Boch. Continued experiments on disinfection of the lid margin and conjunctival sac. The effect of 0.75 % salt solution on the micrococcus pyogenes aureus.



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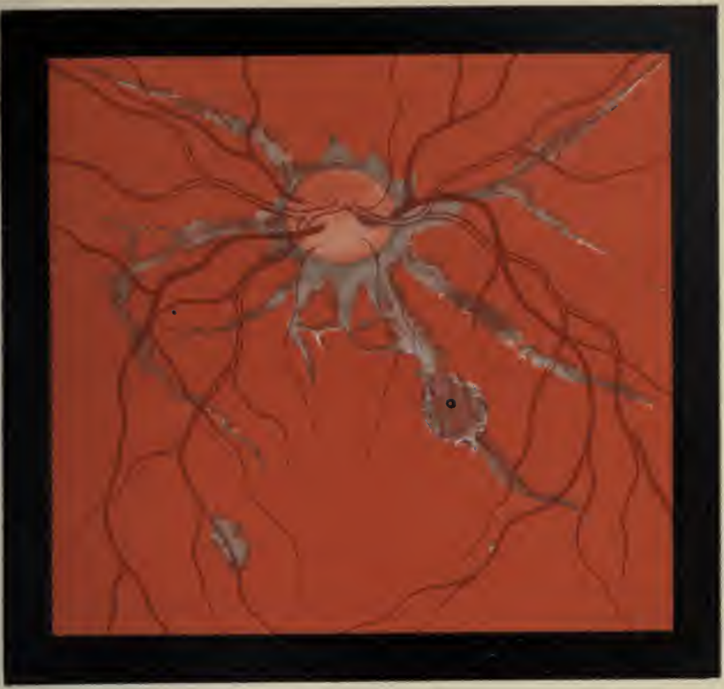

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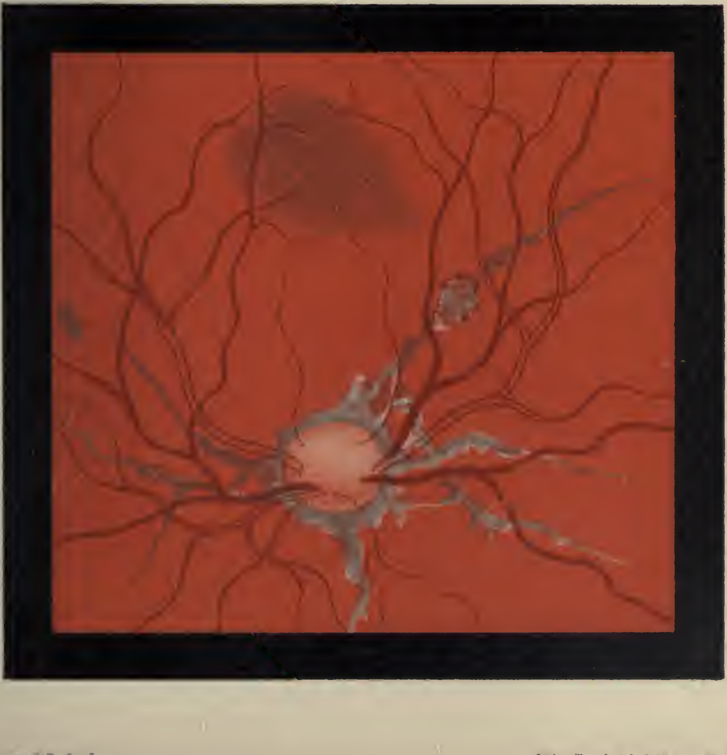

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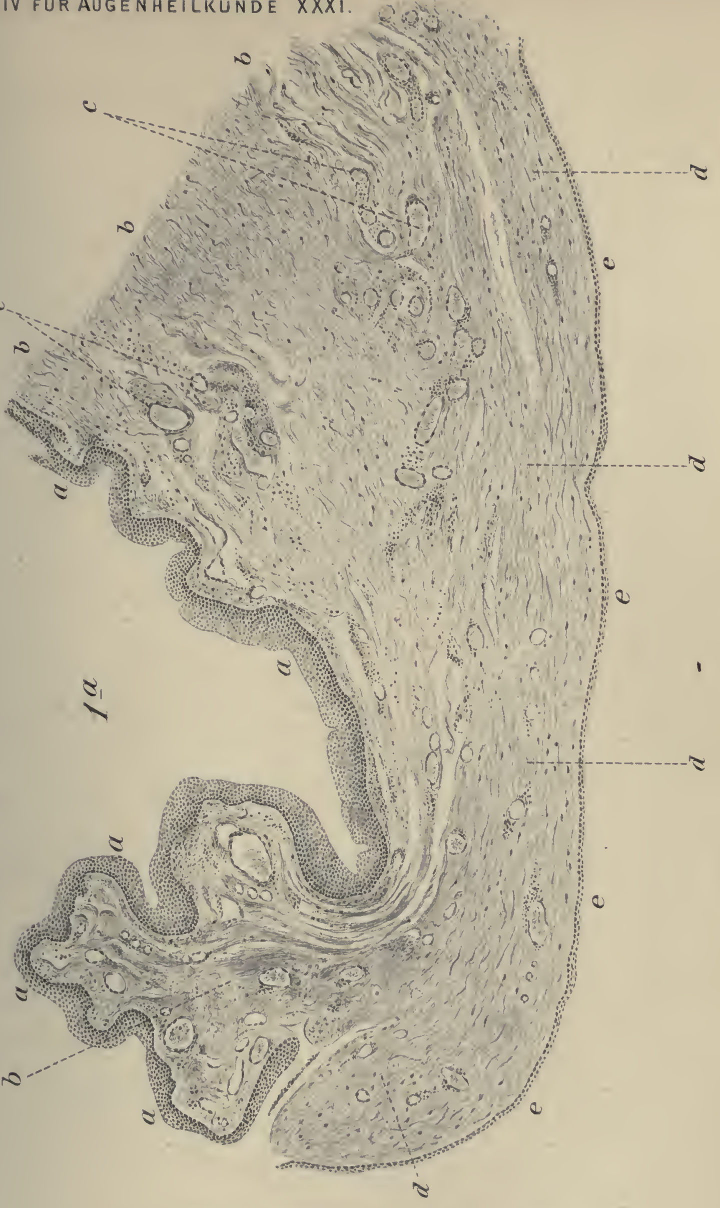

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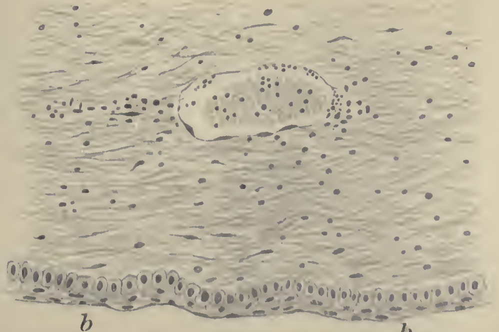

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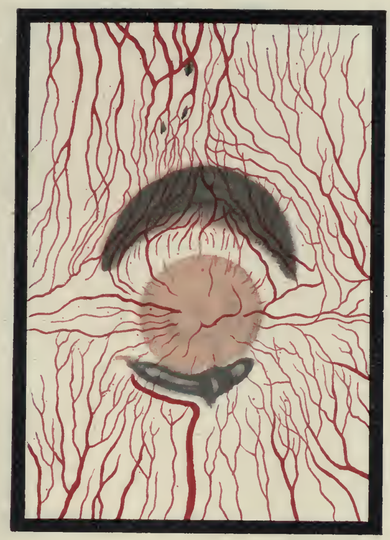

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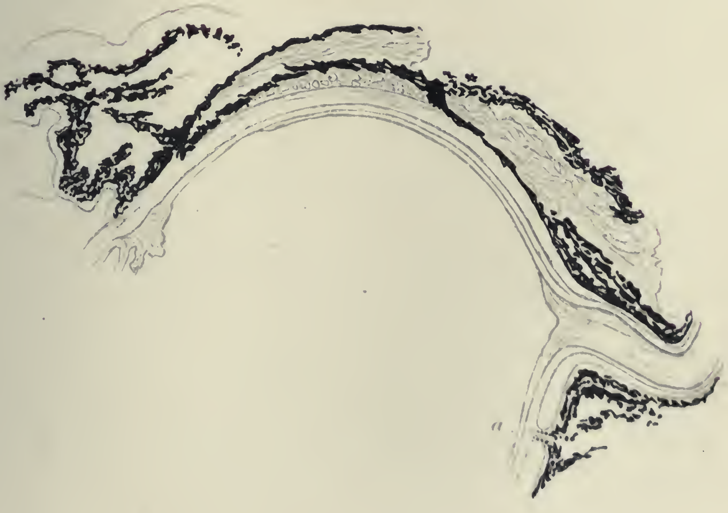
Fig. 2



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ARCHIVES OF OPHTHALMOLOGY.

LISTING'S LAW. WHAT DOES IT MEAN AND WHAT IS ITS PRACTICAL VALUE IN DIAGNOSIS?

By Dr. ALEXANDER DUANE, New York.

(*With three figures in the text.*)

LISTING'S law, although enunciated forty years ago and accepted as true by all observers since, has been quite variously interpreted by different, equally good authorities.[1] Moreover, its practical value in diagnosis has been a matter of some question. It may not be unprofitable, therefore, to inquire:

1. What does Listing's law actually teach as regards wheel-rotation of the eye?

2. Whatever it teaches, has the law any practical value in the diagnosis of muscular paralysis?

WHAT DOES LISTING'S LAW MEAN?

Listing's law states what happens to the vertical meridian of the cornea (or retina) when the eye passes from one position to another. It is thus enunciated by Helmholtz:

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[1] Thus the interpretation of the law given in this paper is in accordance with the statements of Donders, the two Graefes, Mauthner, LeConte, and most clinical observers, as well as with what seems to be the obvious deductions from anatomy. A precisely opposite interpretation is adopted by Helmholtz, Hering, and others. Embracing the views of the authorities last named, Dr. Eaton, in the course of a very appreciative and generous review of my "Motor Anomalies of the Eye" (in the *Ophthal. Record*, August, 1897), says that according to this law my explanation of the wheel-rotation of the eye in the various oblique positions is incorrect, and that, furthermore, this inaccuracy vitiates to some extent the deductions put forth in regard to the diagnosis of muscular paralysis. I believe that both of these criticisms are invalid, and that sufficient reasons for this belief are contained in the following pages.

When the line of sight[1] *passes from the primary position to any other position, the wheel-rotation of the eyeball in this second position is the same as if the eyeball had been rotated about a fixed axis, perpendicular to both the first and the second directions of the line of sight.*

"Simple as this law is," says Mauthner, "and simple as it sounds, there is certainly no one that ever understood it at the first hearing." With this warning in our mind let us picture to ourselves anew precisely what Listing's law does mean. For this purpose let us take Fig. 1, in which O is the centre of rotation of the eyeball, OA the line of sight when the eye is in the primary position, and OB the line of sight when the eye is in a secondary position B. The circle APA′P′ will represent that meridian of the eyeball (meridian of the cornea and retina) which is vertical when the eye is in the primary position. Call this the *prime corneal* (or *retinal*) *meridian*, and its plane the *prime meridian plane*. Then

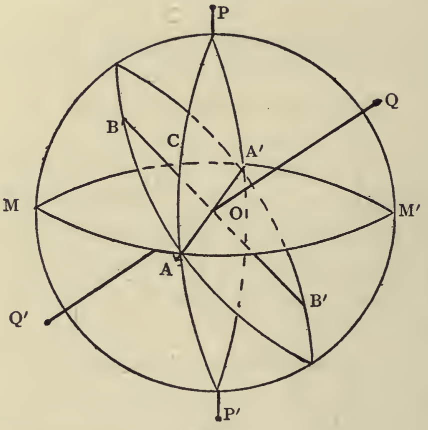

FIG. 1.

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[1] Following LeConte, I have used the term "line of sight" as the equivalent of "Blicklinie." "Line of fixation" would perhaps be more accurate, but to English ears it conveys an extraneous idea derived from our common use of the word "to fix." Our verb "to sight" really corresponds accurately to the German "fixiren" or "blicken" (as used by Helmholtz), and the term "sighting-line," or the less clumsy although not quite as accurate "line of sight," is for English readers more expressive of what is meant by "Blicklinie" than "line of fixation" would be. So, too, "point of fixation" and "object fixed" are better rendered by "point sighted" (or "sighting-point") and "object sighted."

Listing's law asserts that this prime corneal meridian and plane will, when the eye passes into the secondary position B, be tilted precisely as they would if the eye had got to B by rotating round the fixed axis QQ′, perpendicular to OA and OB. Moreover, as Donders showed, and as all observers since have also found,[1] the prime corneal meridian will be tilted in the same way, no matter how the eye gets from position A to position B ; *i. e.*, the wheel-rotation is the same, no matter whether the eye moves first out and then up, or first up and then out, or by a zig-zag movement up and out at the same time.

Now, applying this law to a concrete example, let us ask what, *according to it*, will happen to the corneal (and retinal) prime meridian when both eyes are directed up and to the right. We shall be surprised to find what different answers are given to this question.

Thus Donders, reasoning from experiment, declares that the prime meridian would, under these circumstances, be rotated to the right.

Helmholtz, basing his statements upon experiment and upon Listing's law, says that it would be tilted to the left.

Mauthner, who also professes to rely upon Listing's law, says that it would be tilted to the right.

LeConte, both upon the basis of Listing's law and of experiment, directly controverts Helmholtz, and says that the prime meridian would be tilted to the right.

Other minor discrepancies are encountered, *e. g.*, as to whether a torsion (in the sense of a rotation of the eye about its antero-posterior axis) ever occurs or not.

Now, some may maintain that these contradictions are only apparent, and that whether the prime meridian is tilted to the right or to the left, depends, so to say, upon the point of view of the spectator, *i. e.*, upon the way in which this meridian is projected. This is very possibly true, but it does not affect the practical question, which is, *How will the prime meridian be tilted with reference to a vertical object looked at, or with reference to the image of this object formed upon the retina ?*

---

[1] Helmholtz.

To make clear what is meant by this relation, suppose (Fig. 2) that the eye is in the primary position with its line of sight passing through A, and is sighting or "fixing" a vertical line directly in front of it. Such a line will lie in the plane of the corneo-retinal prime meridian AP, and the retinal image of the line, being also vertical, will be parallel to this plane.

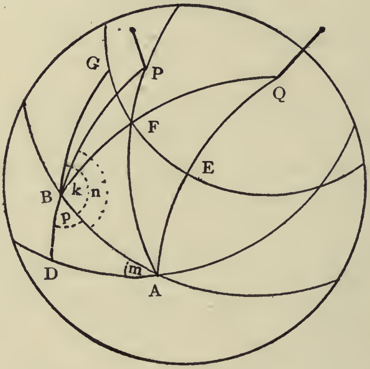

FIG. 2.

Suppose now that the eye swings horizontally to the right, so that the line of sight passes through D, and the eye once more finds a vertical line directly in front of it, *i. e.*, in the prolongation of the line of sight. Then, according to all observers and all interpretations of Listing's law, the corneo-retinal prime meridian will still be vertical, *i. e.*, will coincide with the meridian PD. Hence the vertical line sighted (which necessarily lies in the plane of the meridian PD) must, as in the previous instance, lie in the plane of the corneo-retinal prime meridian; and the (vertical) retinal image of the line must as before be parallel with this plane.

Lastly, suppose the eye, after having been thus swung to the right, to be raised until the line of sight passes through B. The vertical line directly opposite the eye will still form a vertical image upon the retina, so that not only will the line itself still lie in the plane of PD, but its retinal image will also still be parallel to this plane. But will the corneo-retinal prime meridian still be parallel with this line and with its retinal image, *i. e.*, will it still coincide with PD as it did when the line of sight was horizontal? If not, *will it become tilted to the right or the left* of PD as the eye rises?

To answer this question, let us refer again to Fig. 1. The axis QQ′ which necessarily passes through the centre of rotation O, is perpendicular to the diameters AA′ and BB′ at O. Hence the distance, measured along the surface of the sphere, from Q to A and from Q to B is 90°. Consequently if, as Listing's law asserts, A gets to B by rotating about QQ′ as an axis, *it must do so by moving along the arc of a great circle* AB of which Q is the pole.[1]

Reverting now to Fig. 2, draw the meridians QA and QB, and through the point F where QB intersects PA draw a small circle EFG parallel to AB and intersecting QA in E. Lay off FG = EF, and connect B with G by the great circle BG. If we liken the eye under these conditions to a terrestrial globe, Q would be one of the poles around which the globe revolves and AB would be the equator. EFG would be a circle of latitude, and in the rotation of the globe about the axis QQ′ a point F on such a circle will travel over a distance equal to EF, while a point A on the equator is travelling over the distance AB. Hence as FG = EF, the point F will as it revolves around QQ′ move to G, while the point A is moving to B. Consequently the prime meridian AF, if it follows Listing's law, will at the end of its rotation have the position BG.

Since, as already shown, AB is the arc of a great circle, the figures BAD, QAB, and PBA are spherical triangles. In these triangles denote the angle BAD by m, ABD by p, and PBA by n. Also denote the angle GBA by k. Then

$$n = 180^\circ - p \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

and

$$k = 90^\circ + \text{angle GBQ} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

---

[1] Listing's law might, therefore, be enunciated in this form:
When the eyeball is in any secondary position, it always has the same wheel-rotation, i. e., the same deflection of its prime corneal meridian from the vertical, that it would get by having the corneal end of the line of sight travel from the primary to the secondary position directly, i. e., along the arc of a great circle.

Now the figures GBF and EAF are equal,[1] hence

Angle $GBQ = \text{angle } QAP = 90^\circ - PAB = m$..(3).

Hence

$k = 90^\circ + m$..........................(4)

Subtracting (1) from (4) we have

$k - n = m + p - 90^\circ$..................(5)

But, as the angle $BDA = 90^\circ$ and as the sum of the angles of a spherical triangle is always greater than 180°,

$m + p > 90^\circ$..........................(6)

Hence

$k > n$..................................(7)

i. e., BG lies to the right of PD. In other words, *the corneo-retinal prime meridian, which coincides with PD when the line of sight passes through D, becomes tilted to the right of PD as soon as the line of sight rises to B. And it is tilted to the right, not only as compared with the vertical meridian PD, but also as compared with a vertical line which the eye is sighting at the time, and as compared with the (vertical) image of such a line upon the retina* (see ante p. 500).

In a similar way Listing's law may be applied to determine the position of the corneo-retinal prime meridian in the other oblique positions of the gaze (up and left, down and left, and down and right). The results will be concordant with the above and may be stated thus[2]:

When the gaze is directed up and to the right or down and to the left, the corneo-retinal prime meridians of the two eyes are tilted to the right; when the gaze is directed up and to the left or down and to the right, the corneo-retinal prime meridians are tilted to the left.

Or, to use the more technical language adopted by Helmholtz, in which movements up, movements to the right, and right-handed wheel-rotations are all called +, while the contrary movements and rotations are called −, we may say with Mauthner:

---

[1] For EA and BF, being meridian-arcs included between the same parallels of latitude, are equal; $EF = FG$; and $BGF = AEF = 90^\circ$; hence the two figures, having three of their homologous parts equal, are equal in all their parts. Or, the same thing may be shown by rotating the figure EAF about QQ′ until A reaches B, when it will be found that the two figures coincide in all their parts.

[2] Mauthner.

When the lateral and the vertical movements performed by the line of sight in arriving at any secondary position are of the same sign, the wheel-rotation in such secondary position is positive; when they are of opposite signs, the wheel-rotation is negative.[1]

This statement, it will be observed, is the direct converse of that contained in Helmholtz's *Physiological Optics.*

It may be added that these relations above enunciated may be *readily demonstrated on a terrestrial globe* which is so mounted as to admit of rotation on an oblique axis, *i. e.*, one not passing through the north and south poles. To reproduce the conditions of Listing's law, this axis must lie in a plane at right angles to the prime meridian (*i. e.*, in the plane of the meridian that is situated 90° east and west o Greenwich). For rotations about any such axis it will be found that the meridian of Greenwich on the globe (corresponding to what I have called the corneo-retinal prime meridian in the eye) will be tilted to the right or to the left of the true vertical in precise accordance with the statements above enunciated.

EVIDENCE FROM PHYSIOLOGY.—Although it is beside my purpose to discuss this question in its physiological aspect, I may say in passing that, just as authorities differ in their interpretation of Listing's law, so also they differ as to the inferences (with regard to the position of the corneal prime meridian) to be drawn from the study of the after-images. Donders from a study of this sort came to a conclusion identical with that here presented. Helmholtz,[2] observing the same phenomena, drew from them directly opposite inferences. Here again, therefore, it is a question not of the facts, but simply of the interpretation to be put upon the facts; and LeConte[3] has given convincing reasons for regarding Helmholtz's interpretation as invalid.

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[1] This is a very free rendering, although it expresses the precise sense of Mauthner's statement. His actual words are:

"Haben Seitenwendungs-und Erhebungswinkel das gleiche Vorzeichen, so ist der Raddrehungswinkel positiv. Haben Seitenwendungs-und Erhebungswinkel das entgegengesetzte Vorzeichen, so ist der Raddrehungswinkel negativ." (*Augenmuskellähmungen*, pp. 516, 517.)

This is Helmholtz's enunciation (*Physiol. Optik*, 2d ed., p. 620) with the substitution of positive for negative, and vice versa.

[2] *Physiol. Optik*, 2d ed., pp. 621 *et seq.*

[3] *Sight*, part iii., ch. i.

IS LISTING'S LAW OF VALUE IN THE DIAGNOSIS OF MUSCULAR PARALYSIS?

We have seen that there are two diametrically opposite interpretations of Listing's law. And we may now ask: What difference, after all, will our adoption of one interpretation or the other make in our conception of the behavior of the double images in paralysis? The following considerations will serve to elucidate this question.

Suppose that the eyes are directed at a vertical line situated 30° to the left. Under these conditions (Fig. 3, I) the prime meridians (MN, M′N′) of the two retinæ will be vertical and will hence be parallel with the retinal images of the line (BA, B′A′); and the line itself will appear vertical. Now suppose that the eyes are raised 30°. The line will still appear vertical and its retinal images will be vertical. The same will be the case if the eyes are depressed 30° below the horizontal plane. But in the former case, if we adopt the explanation of Donders, the retinal prime meridians (MN, M′N′) will be tilted to the left (Fig. 3, II), and in the latter case to the right (Fig. 3, III) of the retinal images. And if we adopt Helmholtz's explanation, the retinal prime meridians will be tilted to the right in the former case (Fig. 3, III) and to the left in the latter (Fig. 3, II). Hence on either hypothesis the relation of the retinal image of the vertical line to the retinal prime meridian differs in the upper and lower fields and indeed is constantly changing. That, nevertheless, the line looked at appears vertical in all directions of the gaze shows that our notions as to the verticality of a line are not dependent upon the fact that it coincides with the plane of the corneo-retinal prime meridian or indeed bears any fixed relation to the latter. The prime meridians, in fact, may be tilted in any way whatever or be vertical, but, however they are disposed, so long as they present the relations that experience has taught us to regard as normal, a vertical line looked at will appear vertical. *It is only when these normal relations are disturbed that a vertical line will cease to look vertical;* and then its apparent deflection from the vertical will depend solely upon the kind and amount of the disturbance, and not upon what the conditions were that existed before the disturbance was set up. Hence in a diagnosis based upon the double images we have only to reckon with the morbid

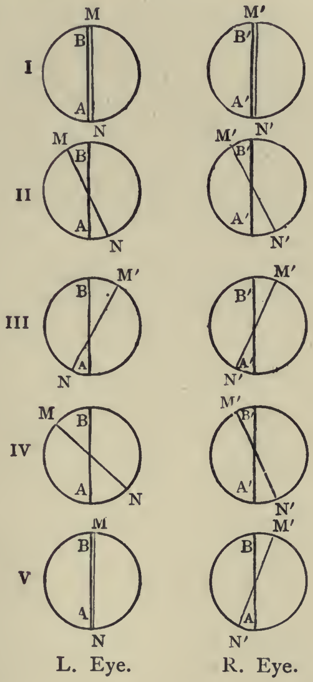


Fig. 3.—View of Retina of the Right and Left Eyes Seen from Behind, Showing Varying Relations of Retinal Images and Retinal Prime Meridians in Different Positions of the Gaze.

BA, $B'A'$, images of a vertical line upon the retina. MN, $M'N'$, retinal prime meridians of right and left eyes. I shows relation of retinal images and retinal prime meridians when eyes are directed horizontally to the left. II shows the relation that, according to Donders, exists when the eyes are directed up and to the left, or that, according to Helmholtz, exists when they are directed down and to the left. III shows relation existing when eyes are directed down and to the left (Donders), or up and to the left (Helmholtz). In all the foregoing cases the two retinal prime meridians, however directed, are parallel. IV, V show relations existing in paralysis of the left superior oblique when the eyes are directed down and to the left. The retinal meridians diverge. IV represents the actual arrangement of the retinal meridians according to Helmholtz. V, according to Donders. In both arrangements, the left prime meridian (MN) is deflected by an equal amount to the left of its normal position, and the degree of divergence of MN from $M'N'$ is equal.

alterations of the positions of the retinal prime meridians and need not concern ourselves with what this position was before being altered.

To illustrate by a concrete example. If (Fig. 3) we look down and to the left directly at a vertical line, that line forms vertical images (BA, B′A′) upon the two retinæ; the retinal prime meridians (MN, M′N′), whether their actual position is represented by II or III, are parallel; and the line itself will appear to us vertical. Suppose now that the left superior oblique is paralyzed. The left prime meridian, owing to this paralysis of one of its right-handed wheel-rotators, is tilted to the left of its normal position, and the prime meridians of the two eyes, consequently, instead of being parallel, diverge; and diverge by an equal amount whichever interpretation of Listing's law we adopt (Fig. 3, IV and V). The result, according to the well-known law of projection is that now two images of the line are seen, with the upper end of the left image converging towards that of the right. *The amount of this convergence of the double images will obviously depend solely upon the amount of divergence of the retinal prime meridians*, and it will be the same whether we regard IV or V as expressing the actual arrangement of the prime meridians in the case of paralysis; *i.e.*, whether we regard II or III as the arrangement under normal conditions. In fact, it does not matter whether the prime meridians were originally both vertical, or both tilted to the right (as Donders says), or both tilted to the left (as Helmholtz says), so long as their position, whatever it was, was the one that in experience had been associated with normal conditions and consequently with normal ideas with respect to the attitude of objects looked at. When this was the case the line looked at appeared vertical. Again it matters not whether the new position of the left prime meridian, due to the paralysis, is actually vertical, or is tilted to the right, or is tilted to the left, *so long as it is to the left of its normal position.* In this case the image of a vertical line formed by this eye will always look tilted to the right.

Hence *the paralysis of a superior oblique will produce the same definite disturbance of wheel-rotation and the same sort* *of tilting of the double images, whatever interpretation we put upon Listing's law, or even if we reject the law altogether.*

Once more. Even if Listing's law did have a bearing upon the way in which the double images are tilted in paralysis (and what has been said shows that it does not), it must be remembered that our diagnosis of paralysis is never dependent upon the presence or absence of such tilting. It is made rather upon the presence or absence of a vertical or lateral diplopia increasing in a certain direction of the gaze. With such a diplopia Listing's law has nothing to do.

The answer to our second question, therefore, is:

Listing's law has no significance whatever in the diagnosis of muscular paralysis.

NEW OPHTHALMIC OPERATING TABLE.

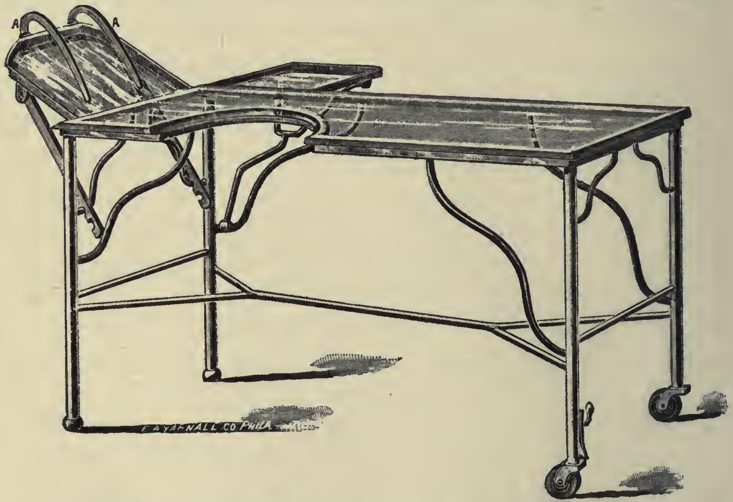
By L. Webster Fox, A.M., M.D.,

PROFESSOR OF OPHTHALMOLOGY IN THE MEDICO-CHIRURGICAL COLLEGE AND HOSPITAL,
PHILADELPHIA, PA.

(*With one figure in the text.*)

THIS table was devised by the author to overcome the many difficulties to which ophthalmic surgeons are subjected when operating on ordinary tables now in use.

A semicircle is cut out of the glass top, and a curve is made in the frame on the left side, which enables the operator to stand more directly in front of the patient's face. By this simple device one may more dexterously operate on the right or left eye with either hand, and its advantages are still better shown when performing plastic operations on either side of the face. The head-rest is raised or lowered


A
A
E. A. YARNALL CO PHILA

with a ratchet to give better position to the head in operating for cataract or squint.

The clamps *AA*, which are slightly curved and press against the side of the head, holding it firmly in place, were suggested by Prof. Laplace. A small leaflet accompanies the table, which may be attached to either side, and is used for the instrument tray.

I am indebted to E. A. Yarnell & Co., 1020 Walnut Street, Philadelphia, for carrying out my design.

THE CLINICAL SIGNIFICANCE OF BI-TEMPORAL DEFECTS OF THE VISUAL FIELD.

BY DR. G. ABELSDORFF, BERLIN.

Translated by Dr. J. A. SPALDING, Portland, Me.

(*With twelve figures on Plates III. to VIII. of Vol. XXXI.*, *German Edition.*)

IF the conduction of all of the fibres of the optic nerve which cross at the chiasma is totally cut off by pressure acting upon the middle portion of that region, the affection reveals itself clinically by the loss of the temporal halves of both visual fields. If from this undeniable fact we were to draw the conclusion that the loss of the temporal halves of the visual field is invariably to be referred to an affection of the chiasma, we call into service a very useful, but logically untenable conclusion, in that we are led to believe that we can at pleasure exchange the major and minor premises of our argument. The chiasma, despite the dangerous situation in which it lies, owing to which it can be sympathetically affected by so many neighboring parts, is, in point of fact, but rarely affected. It is also, *a priori*, clear that temporal hemianopsia especially, a disease limited to the fasciculi cruciati, can never be observed as often as homonymous hemianopsia, because the cause of the latter may arise from a more extensive region—the *tract* itself, as well as in its farther central course, provided that the injury is limited to one side. For this reason, then, the number of published cases of homonymous hemianopsia far exceeds that of temporal hemianopsia. Moreover, the number of the latter is actually smaller than appears at first sight, because the erroneous conclusion mentioned above is not, as it should be, invariably avoided by the observer in question, so that the absence of both temporal fields in diseases of the optic nerve itself is regarded and entitled temporal hemianopsia. If, however, we cling to the usual terminology and count as hemianopsia only such symptomatic defects of the visual field as are produced by a single central focus, the mere absence of the temporal halves of the field does not suffice for the diagnosis of temporal hemianopsia, which is only actually assured by a knowledge of the course of the disease and associated symptoms pointing to an undeniable central affection. As it now almost invariably happens that a prolonged period of observation is hindered by the patients passing from view, I beg leave to offer here the history of two women with bi-temporal defects in both visual fields, several years after they had been carefully examined at the University Clinic in Berlin.

CASE I.—Lina, aged forty-three, unmarried, is of a healthy family, and has no recollection of serious disease during youth, but at about fourteen the left leg began to get weak, so that she would fall to the ground, and have to lie abed for a few days to recover strength to walk. At about the same time the fingers of the left hand began to swell, together with the left tibia, which gradually increased in size, but without pain. The menses came on at sixteen and remained regular till the patient was twenty-eight, when they suddenly ceased, and soon after the swellings on the fingers showed rapid growth, the fourth finger on the left hand being amputated to prevent the disease extending into the palmar region. From that time on to the age of thirty-nine, the patient's health was good, but then she began to suffer from headache and loss of sight.

The examination at the clinic in January, 1895, showed normal conditions of the body, including mobility and sensibility, except the enchondromata on the three fingers of the left hand and on the left tibia, as the tumors were called by Langenbeck, who wrote to me at my request about the operation on the finger.

The sense of smell is so much reduced that only strong odors like that of chlorine water are perceived. The right antrum of Highmore contains much pus, which has apparently existed for a long time, as the patient admits having perceived for years a purulent outflow from one nostril. But this peripheral affection offers no satisfactory explanation for the loss of the sense of smell, so that the cause must be sought for in the olfactory nerve or farther in the nerve centres.

The vision in 1891 was, as we found from the note-books, O D $\frac{6}{12}$ and O S $\frac{6}{18}$. The left eye showed a defect in the field occupying the outer-upper half in the form of a scotoma, through which objects could only be seen indistinctly. In the right eye the field was good (Figs. 1 and 2). Colors were well seen with both eyes. Normal ophthalmoscopic image in both eyes, O D H + 2 D S, O S H + 1 D S.

The sight gradually decreased during the following months, and the patient suffered repeatedly from pain in the head and nausea. The vision in September, 1892, was $\frac{6}{20}$ O D and $\frac{6}{50}$ O S. Total defect of the temporal halves in both eyes, with simultaneous contraction of the nasal half in the eye having the poorer vision (O S). as shown in Figs. 3 and 4.

I saw the patient in 1894 and found vision O D with + 1 D S $\frac{6}{20}$, O S with same lens, $\frac{6}{25}$. As the vision had improved, so the field for white had widened quite noticeably. The general condition of the fields is shown in Figs. 5 and 6. The movements of the eyes are normal in all directions, the pupils react promptly, and the ophthalmoscopic picture is normal.

From this time on, the patient improved rapidly, and, in 1895, the vision with + 2 D S was O D $\frac{6}{10}$ and O S $\frac{6}{20}$, and reading was not difficult for ordinary type.

Figs. 7 and 8 show the general condition of the fields. The left eye shows a dividing line of the visual field in the temporal halves ; the previous defect in the lower portion extending to the nasal half is no longer present, but at this spot the field passes farther to the temporal side as a triangular zone of misty vision in which colors are not perceived. The fixation point, from the division line, is halved for white as for colors.

The right eye, with nearly normal vision, shows restitution of the field over the central portion, but the temporal halves of both eyes still show loss of perception for colors.

Case 2.—Martha, aged twenty-six, was, with the exception of the measles, healthy in childhood, until at the age of twenty-two, the menses which had before been regularly established suddenly ceased. The patient now suffered severely with headache and later with loss of vision, for which she attended the University Eye Clinic in Berlin, where I find noted for October, 1892, O D

$\frac{6}{20}$ and 0.75 type, at 20 *cm* O S. $\frac{6}{20}$ and the same type. Both papillæ very pale, and retrobulbar neuritis diagnosticated.

The patient used diaphoretics at home and did not return until 1894, when we discovered O D $\frac{1}{8}$, O S $\frac{1}{15}$. Movements of the eyes were normal, pupils reacting freely, and an ophthalmoscopic picture of optic atrophy in both eyes. The vessels show no alterations, but the left lamina cribrosa is very distinct.

The visual fields are shown in Figs. 9 and 10.

On examining the field with a piece of white paper 1 *cm* square, we find in each eye (Figs. 9 and 10) a total defect of the temporal halves, whilst in the left eye the nasal half also is no longer intact. But whilst in this eye colors are still recognized, and the visual field for these coincides with that for white, there is in the right eye an actual scotoma for red, within which red is called yellow.

Examination of the other organs of the body revealed nothing abnormal; but, owing to the pronounced amennorrhœa, the patient was referred to the gynæcological clinic, where retroflexion and hyperplasia of the uterus were found.

Much as the visual fields in both patients resemble one another at a particular stage of the disease, yet their entire clinical course was different and antagonistic. *In the first case* the disease began with pain in the head, vertigo, and nausea, with that farther cerebral symptom of excessive diminution of the sense of smell. The disturbance of vision began with a temporal defect in the visual field of both eyes; later, we had total loss of the temporal visual fields, the ophthalmoscopic appearances remaining, in the meanwhile, perfectly normal till, finally, improvement ensued in that the vision of the left eye increased from $\frac{1}{8}$ to $\frac{1}{4}$, whilst that of the right eye became nearly normal. In this case, also, the temporal half of the field was mostly restored, although the perception of colors in that district was not.

At present, therefore, there exists only a temporal hemianopsia for the perception of colors, and we have the diagnosis of a basilar focus of disease which chiefly affects the middle portion of the chiasma, but in front has extended so far that it has additionally affected the optic nerve. This is probably the truth of the matter, whilst the course of the disease proves that the morbid focus may be regarded as relatively benign. If we, therefore, diagnosticate a benign tumor as the cause of the pressure on the chiasma and nerves, the visible predisposition of the rest of the body toward the formation of enchondromata would lead us to favor the presence of such a sort of tumor at the base of the skull. The mere fact that it was not until late in life that the enchondroma excited ocular symptoms can be explained by reference to many other observations according to which, enchondromata arising in childhood are at more advanced years accompanied with other new ones in other portions of the body, or those already present show renewed growth.[1] Similar remarkable improvement in vision has been repeatedly observed in chiasmal diseases which were produced by tumors, and in which the correctness of the diagnosis was confirmed by the autopsy.[2]

Now, on the contrary, *the second case* offered nothing in support of the diagnosis of a central focus of disease. A woman of twenty-six, with pallid optic papillæ and loss of sight three months before, shows together with greatly reduced vision and well pronounced optic atrophy a defect of the temporal halves of the visual field. Of course, the mere notice in the books of a retro-bulbar neuritis is no proof, but that that evidently was a case of atrophy due to chronic inflammatory conditions, is shown by the central scotoma for red and green in the left eye, and the opacity in the lamina cribrosa of the right.

It is also well worth observing that the patient suffered from amennorrhœa which appeared a short time before the diminution of vision. Of course a single case of *post hoc, ergo propter hoc*, amounts to nothing, but the coincidence of two rare affections is here remarkable enough to deserve consideration, since the coincidence in optic-nerve diseases without the apparent ætiology has been repeatedly observed by Leber,[3] and also by Foerster.[4] Simple as it seems to regard both diseases as the expression of a common constitutional cause, the knowledge of the actual cause would not be furthered by this explanation, and the connection between the two is probably best explained by accepting Foerster's idea, that with early atrophy of the uterus at a time when the menses ought to establish themselves, fluxions occur toward various parts of the body, and that in this way an "insufficient menstruation, due to atrophy of the uterus, simultaneously exciting fluxions to the retina and optic nerve, forms the starting-point of the optic-nerve atrophy."

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[1] Weber, "Zur Geschichte des Enchondroms." *Virchow's Archiv*, xxxv., p. 501.

[2] Saemisch, *K. M. f. A.*, 1865, p. 51, and E. Muller, *v. Graefe's Archiv*, viii., 1, p. 160.

[3] *Graefe-Saemisch*, Band v., p. 817.

[4] *Graefe-Saemisch*, vii., p. 100.

It cannot be denied that in the second patient the eye disease can also be explained by an affection of the chiasma. But if we grant that the nerve bundles of the optic nerve have a tendency to become sympathetically affected, there is no foundation for the forced idea of a central lesion assumed simply to favor this scheme.

It is easy to prove by plenty of clinical witnesses, that often enough in genuine optic atrophy, so long as it is not yet total, symmetrical bundles are at first affected, since in that form of progressive optic-nerve atrophy which is not probably of cerebral origin, defects simulating the hemianopic appearances associated with tabes dorsalis have been observed and actually entitled as such.[1] Furthermore, a case by Schoeler and Uhthoff[2] illustrates how both lower halves of the visual field can fail without actually deserving the name of hemianopsia inferior. Later in this case the symptoms of tabes appear.

As a third illustration, I will cite the following case from my own personal knowledge:

Mrs. Clara R. æt. thirty-three, was seen in 1895; vision with + 2 D S O D $\frac{1}{6}$ and with same lens O S $\frac{1}{20}$. The right eye recognizes red only, the left eye blue only. Examination of the field shows that the temporal half of the left eye is lost, and only a small part of the same in the right eye is preserved (compare Figures 11 and 12.) The ophthalmoscope reveals optic atrophy. The patient exhibited many of the symptoms of tabes, such as Romberg's symptom, absence of the patellar reflex, feeling of cold in the feet, analgesia of the legs, and incontinence of urine. Subsequent investigation showed that tabes had been diagnosticated five years before and that optic atrophy was also present.

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[1] Lang and Beevor, "Bi-nasal Hemianopsia in a Case of Tabes." *Transac. Ophthal. Soc. U. K.*, xiv., p. 246.

[2] *Beitraege zur Pathologie des Sehnerves*, Berlin, 1884, p. 15.

All instances of symmetrical defects in the visual field in spinal optic atrophy show that the disposition to symmetrical disease is inherent in the nerve bundles of the nerve itself. Wilbrand's experiments to demonstrate, anatomically, by the arrangement of the nerve-fibre bundles the undeniable tendency to similar affections of the visual field in each eye in the most varying forms of optic-nerve disease[1] miscarried owing to the varying situation of the visual-field defects. In recognition of the fact that in a certain developmental stage of the optic-nerve atrophy the disease often reminds us deceivingly of temporal hemianopsia, he should like to explain the symmetrical affection in this way, that in the fasciculus cruciatus, which carries the vast majority of the optic-nerve fibres, the atrophy had advanced to the chiasma, and that beneath the pressure of the shrivelling nerve fibres, there crossing and intertwining closely together, the function of the still normal bundles of nerves in the central portion of the chiasma was soon destroyed, until finally the fibres of the lateral bundles were totally involved in the same process.[2] Inasmuch as the before mentioned cases offer examples of the absence of the nasal as well as of the lower visual fields in progressive optic-nerve atrophy, Wilbrand's anatomical explanation is, to say the least, insufficient, and we must be satisfied with the more functional explanation of the *disposition* of the optic nerve to symmetrical affections of its various bundles.

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[1] *v. Graefe's Archiv*, xxii., 3, p. 321.

[2] Wilbrand, *Ueber Hemianopsia und ihr Verhalten zur typischen Diagnostik der Gehirnkrankheiten*, 1881, p. 40.

THE UTILITY OF THE X RAYS IN DETECTING AND LOCATING METALLIC PARTICLES IN THE EYE.[1]

By A. B. KIBBE, M. D., Seattle, Washington.

(*With one figure in the text.*)

WITH the means ordinarily at his disposal, it is seldom that the ophthalmic surgeon is unable to satisfy himself of the presence or absence of a foreign body of metallic nature in the eye, should the case-history be at all suspicious. When seen soon after the receipt of the injury, before symptoms of irritation have occurred, the nature and location of the wound, if the body cannot be seen by direct inspection, either by the unaided eye or with the ophthalmoscope, are often alone sufficient to enable him to give a positive opinion, but cases present themselves now and then in which no decision can be rendered, though it may be of vital importance for the safety of the eye, if it contain a foreign body, that operative measures be immediately adopted.

To wait for the onset of inflammatory symptoms — iritis, irido-cyclitis, etc., though they usually give us positive indications—is simply to wait for an excuse as it were to enucleate the eye. To introduce an electro-magnet in a blind attempt to find what may not be present is fraught with too much danger to be resorted to in most cases, and we are therefore too often forced to stand idly by and adopt the most exasperating of all methods of treatment, the expectant plan.

From the ease with which metallic bodies are detected in many portions of the body by aid of the Roentgen rays we might infer that the eye should not be an exception to the general rule, and that metal lodged within it should be quite as readily recognized as elsewhere, but surrounded as it is with dense bone the difficulties are comparatively great.

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[1] Read before the Oregon State Medical Society June 7, 1897.

In order to satisfy myself as to what value, if any, the rays possessed in this particular direction, a series of experiments was begun in August of last year on patients in whose eyes the presence of metal was either known or suspected. The cases are in brief as follows:

Case I.—J. W.—Injured eight months prior to consulting me. Cicatrix on upper lid near edge of orbit; eyeball shrunken and tender to touch. No vision. History of repeated attacks of sympathetic irritation. Examination made at this time with the fluoroscope showed what I was convinced was a large piece of metal. The eye was enucleated the following day, and that evening examined unopened by holding it before the fluoroscope. The particle appeared to be floating in air so sharply was it outlined. On opening the eye, a particle of steel was found nearly filling the atrophied globe. I made only a skiagraph of the globe wrapped in cotton and placed in the orbit of a skull. I have always regretted not having taken a skiagraph of this case, as the large piece of metal would have shown very plainly on the plate.

Case II.—A.A.—Injured three days prior to visit by chip flying from a wedge. Faint linear scar on cornea just below its centre. Traumatic cataract—iritis. Fluoroscopic examination shows what appears to be a faint image of a piece of metal. On the following morning, a very small scale of steel was removed from the lens by aid of an electro-magnet.

Case III.—F.M.—Injured ten days ago by particle flying from head of hammer. Commencing panophthalmitis. Fluoroscopic image not clear. Radiograph taken through the bones of face shows quite clearly a spot on the plate evidently caused by the presence of a metallic particle. Eye enucleated the following day. Metal found imbedded in ciliary region at nasal side of globe.

Case IV.—L.M.—Received injury to left eye eight weeks ago while splitting logs, from particle flying from wedge. Faint scar in cornea a little to the nasal side of centre and in a line with horizontal meridian. Lens opaque, complete posterior synechia, slight tenderness in ciliary region. Inflammatory symptoms comparatively slight at present, though from his statements they had previously been much more severe. Fluoroscope reveals nothing definite. Skiagraph taken through bones of face shows steel, but no positive indications as to location, excepting that it was anterior to the equator and very nearly in the horizontal meridian. The next morning, under anæsthesia, as wide an iridectomy as possible was made upward, and the tip of an electro-magnet introduced beneath the pillars of the coloboma on each side. Not finding the particle, the tip was gently forced through the capsule, and the click of the metal instantly followed. On withdrawing it from the eye, the minute size of the piece astonished me, as I had not realized before that so very small a particle could be detected on the photographic plate, when covered with so much tissue. Measured very accurately, it was two millimetres in length and one in thickness.

This case led me to study all my plates carefully, and from such study it appeared not to be a difficult matter to locate approximately the foreign body, in addition to detecting its presence. The possibility of this latter I felt had been definitely settled by the last case, but I had never before been inclined to believe that anything approaching accurate localization was possible.

CASE V.—J. A., wood-chopper, was injured ten days prior to consulting me by chip flying from head of hammer. According to his statements, vision was not seriously impaired until the following day after he had used what I later learned was "Harlem Oil." Almost immediately on dropping this in the eye vision was practically abolished. No wound of entrance could be detected owing to a moderate chemosis surrounding the nasal side of cornea.

Aqueous cloudy with slight hypopyon under atropia; pupil dilated fairly well, showing a slight adhesion at nasal side. Yellowish reflex in pupillary area. No details of fundus visible. Lens transparent. Skiagraph shows a small particle at about the equator of the globe, but whether to the nasal or temporal side could not be determined. Efforts at extraction by an electro-magnet failing, enucleation was advised but refused. Patient did not return.

Referring to Fig. 1, which is a sketch made from the skiagraph of Case IV, it will be seen that the temporal rim of the orbit is very sharply defined. Anterior to it is a light area, and still farther forward a dark tongue-shaped space. These are designated respectively A, B, and C. The dark area A is the shadow cast by the dense bone at the orbital rim; B represents the tissue of both eyes and the orbital plates of the ethmoid; and C the lachrymal bones and the nasal process of the superior maxilla.

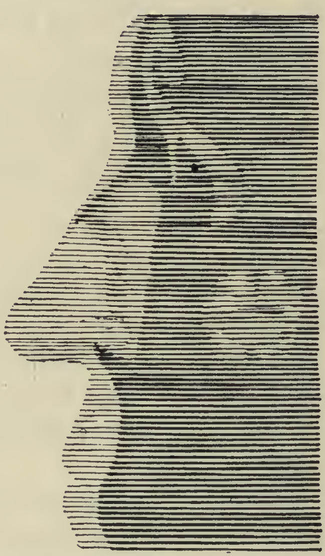

FIG. 1.—Reduced one-half from a skiagraph of Case IV.

Taking these as landmarks and applying to them deductions to be drawn from Cases IV and V, we have certain factors in locating the foreign body which, in general, are reliable. In Case IV the body was found in the lens, and the spot on the plate was about the centre of the area C, that is in the portion representing the lachrymal bones and the nasal process of the superior maxilla. In Case V the body showed itself in the light area, B, or in a line with the orbital plates of the ethmoid. As the lens in this case was transparent and the iris active, it is certain that the body must have been lodged back of the lens. For the average eye, therefore, it would seem to be safe to assume that if the body shows in B, it is back of the lens, and if in C, it is either in the lens substance or in close proximity to it. When a body is outlined against the dense bone of the orbital rim, it will be found, in the vast majority of instances, to lie in the posterior pole of the eye.

For very prominent eyes these landmarks will hold good by simply making allowance for the assumed greater protrusion. Thus a body in the lens would show farther forward in C; one back of that body and near the equator would approach C; and one in the posterior pole would appear in the light area B. For deeply set eyes the opposite would be the case.

In this way we may arrive at a fairly accurate conclusion relative to the depth at which the body lies, but we are unable to determine its position in relation to the horizontal meridian, except by deductions drawn from its location with reference to certain anatomical points. For this purpose we may take either the upper or lower edge of the orbit, if plainly shown, and estimate its position by its proximity to either one or the other, or the junction of the nasal bones with the frontal may be used for the same purpose, as this point lies about in a line with the horizontal meridian.

As in every form of experiment, much depends on the character of the apparatus used. For taking skiagraphs of the hand and forearm a very small induction coil suffices, but where it is necessary to pass the rays through a large amount of soft and bony tissue, we require the most perfect appliances available, particularly as the element of time is an important factor, in view of the numerous cases of dermatitis already reported as having followed long exposure. Coils giving from six- to ten-inch sparks in air are large enough, if the tube is a good one and has a sufficiently high vacuum. Ten minutes' exposure with a good tube excited by an eight-inch-spark coil should be ample, and very good skiagraphs of the bones of the face may be obtained in half the time. The tube should not be placed closer than eight inches from the side of the face, and twice that distance if examination by the fluoroscope shows a fairly good outline of the boundaries of the orbit and the antrum. The sensitive plate, either securely wrapped in light proof paper or placed in a plate-holder, should be strapped to the side of the face corresponding to the eye examined, either by adhesive plaster or by a light bandage. Large rubber bands I have found very convenient. The patient should be in an easy position, with the head inclined backward and resting against the back of the chair, which should be high enough to support the head. The eyes should be gently closed. This is absolutely necessary to good results. If allowed to remain open, it is an impossibility for the patient to keep them fixed on one object for the length of time necessary to take a good skiagraph.

The tube should be so placed that the centre of the platinum plate will be in a line joining the temporal edge of the orbits.

Any good sensitive plate answers our purpose, and I have found no great difference between rapid and slow ones. Those individually wrapped, such as are specially prepared for X-ray work by Corbutt, are very convenient and give excellent results.

While this gives us a fairly clear indication of the depth of a foreign body, and certainty of the presence of one, it does not enable us to accurately locate it. The most we can be certain of is its presence, and while in itself this is of enormous advantage, in certain cases accurate localization is much to be desired. With the hope of being able to do this, I experimented for some time in the following way:

Pieces of sensitive plate, three-fourths of an inch in width and two in length, with one end well rounded off, were wrapped in light proof paper and inserted as far as possible into the orbit between the globe and the lachrymal bones, and attempts made to obtain skiagraphs of particles of metal fastened to various points on the lids. While I could get a good image of the particles lying as far back as the plane of the iris, those placed farther back failed to be shown. If the plate was pressed deeply into the orbit, it was too painful, and in addition forced the eye back, so that nothing was gained. I was able in this way, however, to obtain fairly accurate data relative to the position of the particle in reference to its depth within the limits above stated, and its position above or below the horizontal meridian. Inclining the head backward and inserting the plate beneath the upper edge of the orbit, and placing the tube on a line with the cheek, I tried to locate particles with reference to the vertical meridian, but the results were not satisfactory.

Finally the following method was tried in an experimental way by placing shot in various localities about the eye:

A plate closely wrapped in black paper was placed against the temple and firmly fastened by bandage or adhesive plaster. The tube in an adjustable holder stood twenty inches from the plate. Measurements were made from the platinum. The centre of the latter was placed as nearly as possible in a line joining the temporal edge of each orbit. A four-minute exposure having been made, the current was shut off, the tube lowered four inches, and the plate again exposed to the rays four minutes more. In this way two images on the same plate were secured which were separated to a degree equal to the angle formed by the lines emanating from the centre of the platinum. A simple mathematical calculation will then give the exact distance of the particle from either the tube or the plate.

An easy method of applying the measurements to the head is to use two cords adjusted to correspond to the imaginary lines drawn from the centre of the platinum in the tube to the sensitive plate. Placing them in front of the face with their extremities corresponding to the tube on the one side and the plate on the other, the point where they cross will show the position of the particle.

While these experiments were under way and about the time I had definitely satisfied myself of their value, the following case afforded me an opportunity to apply the results in actual practice.

N. J., aged 20, was referred to me May 31, 1897, by Dr. J. W. Bean, of Ellensburg, Washington, on account of an injury to his left eye due to the exploding of a rifle. Examination showed the cornea almost totally opaque and covered with exfoliating shreds giving it a decidedly ragged appearance. Upper lid moderately swollen and very sensitive to manipulation, so much so that attempts at eversion were exquisitely painful. This seemed to be due to the generally inflamed condition of the globe and which I attributed to cyclitis consequent on the presence of a foreign body. Just beneath the brow a small freshly healed cicatrix was visible, not sensitive to pressure, and which marked the site of a small wound which, from the patient's statements, I took to be superficial, as he said Dr. Bean had probed it soon after the injury without finding a foreign body. Here I felt was an opportunity to test the method which had been successful in an experimental way. From the source of the injury it was impossible to decide whether the foreign body, if present, was steel or brass, owing to the fact that the cartridge was of the latter metal and the rifle of the former. My apparatus having been altered somewhat since my last case, by which more intense rays were generated, I felt quite confident that the results could be relied upon, and that should no foreign body be demonstrated assurance could be given that none was present.

The patient was placed in the position previously described, with a sensitive plate bandaged to the side of the face corresponding to the injured eye. The tube in an adjustable holder stood in this instance fourteen inches from the plate. This distance was taken, owing to the exceptionally broad face of the patient and the consequent thickness of the tissue through which the rays were obliged to pass. A four-minute exposure having been made the current was shut off, the tube lowered three and one-half inches, and a second exposure of four minutes made. On developing the plate two images of an L-shaped particle appeared separated about eight millimetres, and outlined against the nasal bones at their point of articulation with the nasal process of the frontal. Calculation showed the particle to be at a point midway between outer and inner canthus, and being so far forward it was either in the anterior chamber or in the lid. A small portion of the outer edge of the cornea being still transparent, a view of the anterior chamber could be obtained sufficiently clear to exclude the presence of so large a body as the plate showed, and I at once decided that it must be in the substance of the lid. The swelling of this structure was, while not excessive, sufficient to conceal a particle, and the condition of the cornea rendered caution in attempts at eversion necessary. Under anæsthesia palpation showed a hard substance in the lid midway between its free border and the cicatrix already mentioned, which when removed by an incision was found to be a piece of the brass cartridge, identical in shape with the image on the plate. How it got there is and always will be a mystery to me. It was deeply imbedded in the tarsus and had cut through the conjunctiva. This may in part account for the lacerated condition of the cornea, though in a letter the attending physician states that the cornea was badly abraded when he saw him soon after the injury. Two sources of its presence may be considered: first, that it entered above at a point where the cicatrix shows, and was drawn downward by contractions of the orbicularis; second, that it struck the cornea and glanced upward against the lid. This latter is in some respects the less probable of the two, but how can the abrasion be otherwise explained? There was no burning of the tissues apparent, and the right eye was used for sighting. Recovery was rapid, and two weeks later the patient left the hospital with a very cloudy cornea but an otherwise uninjured globe.

More positive demonstrations of the value of the X rays could scarcely be demanded. While the sideroscope of Asmus, and the Haab magnet are unquestionably of great assistance in the majority of these injuries, in this instance they would have given no indications whatever owing to the composition of the body.

Though this plan gives us very accurate data for determining the position of the body relative to the vertical meridian, it gives us no indication as to its depth other than what we can derive from its position relative to the edge of the orbit. Were all eyes equally prominent this method would suffice, but at best we could only estimate its depth in this way. In order to apply the principles of triangulation, attempts were made to take skiagraphs with the tube placed at the back of the head and the plate against the brow and cheek; but the dense bone at the occiput and the large amount of tissue through which the rays were required to pass, prevented any reliable results from being obtained —at least with the apparatus at my command. Long exposures, fifteen to twenty minutes, were not tried through fear of producing a dermatitis, a rather severe experience of my own,[1]—having rendered me possibly over-cautious in using the rays, particularly about the head and face. Moderately large bodies, such as No. 4 shot, were capable of detection, but fine No. 10 often failed to reveal their presence. For this reason I feel that unless a very powerful apparatus is at hand, the method of estimating the depth of a body by its position outlined against the various anatomical points, is a better one.

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[1] *N. Y. Medical Journal*, January 23, 1897.

From my experience it appears justifiable to draw the following conclusions:

First. Foreign bodies of metallic nature other than aluminum may be detected in the eye in all but very exceptional instances.

Second. Their location may be determined with sufficient accuracy to guide us in operative procedure for their removal.

Third. Success will depend in great measure on the character of apparatus employed, the skill and experience of the operator and adherence to the rules given for the position of the patient.

Fourth. Long exposures with tubes excited by small coils should be avoided, owing to the danger of exciting dermatitis.

CASES OF OCULAR TUMORS.

By Dr. G. GUTMANN, Berlin.

Translated by Dr. J. A. Spalding, Portland, Me.

(*With Plate IX. of Vol. XXXI., German Ed., and Text-Plate VII.*)

SO many cases of tuberculosis of the eye and of sarcoma of the uveal tract have been published, that new instances of the same disease can only be deserving of notice when they are extremely interesting in the individuality of their clinical appearances or in the curious course which they run. And these characteristics I think I can claim for some cases which were observed in our clinic in 1890 to 1892. One of them was of tuberculosis of the iris and ciliary body in one eye, and of tuberculosis of the choroid in the other eye of the same patient; three others were cases of sarcoma of the choroid which, when first seen, still showed perfect vision of the eye affected, whilst two others were in blind eyes. Cases like the first group have been seen but three times in all accessible literature, whilst enucleation of eyes with vision normal, or nearly so, has received but scattered notice, so far as I have been able to discover.

Case i.—**Tuberculosis of the Uveal Tract in one Eye, and Choroidal Tuberculosis of the other Eye.**

A child of six months was brought to the clinic March 23, 1890, with the following history: He is the youngest of a family of three children, the eldest of which died at the age of five from scarlatina. The second child still lives, and is healthy. The mother is healthy, but the father was attacked with tuberculosis of the larynx in 1889, and died not long after at the age of twenty-eight with symptoms of uræmia.

The grandfather died of inflammation of the lungs, and the grandmother of erysipelatous inflammation of the feet at an advanced age.

The child had been previously healthy, but about a month before we saw it for the first time the mother observed an eruption on the head, and pustules on the face. At the end of a fortnight there became visible in the right eye a brown spot, which soon turned yellow and increased in size, though the eye itself did not get red or inflamed. The child was restless most of the time.

The general examination of the body showed a well nourished child with a bony fissure in the occiput, large fontanelles, and on both arms, scrotum, tibiæ, and face, numerous infiltrations of the skin, corresponding in appearance to *lupus miliaris disseminata*, and suggesting multiple, probably tuberculous abscesses. Pulse, 160 and regular.

The *right eye* has normal lids, conjunctiva, and cornea, but there are deposits on Descemet's membrane, the pupil is jagged and adherent, and on the lens capsule there is a gray patch.

The upper and outer quadrant of the iris is occupied with a yellow, cheesy, warty-looking growth, with a base of about 5 *mm*, and a rounded summit, projecting toward the centre of the pupil. It rests against the inner surface of the cornea, is sharply defined from the tissue of the iris, the margins are bordered with delicate vessels, and at the base there is an appearance like minute nodules in the tumor. The ophthalmoscopic image is normal, except that the optic papilla is somewhat hazy. Tension is normal.

The *left eye*, externally and internally, is normal, except for the following ophthalmoscopic details.

About two or three papilla-diameters from the optic nerve is a grayish, round, irregular tumor, the margins of which run over smoothly into the retina. The level of the summit of the growth is high above that of the retina. Considering the history of the case with the hereditary influence from the father, the case was undoubtedly one of tuberculosis of the iris of the right eye, and choroidal tuberculosis of the left eye.

The tumor in the iris of the right eye gradually increased in size, so that at first only the margin of the pupil was seen, then it passed across the pupil. Later it decreased in size, but at that time a rupture appeared in the sclera. In June, the tumor had perforated the globe of the right eye, and covered the cornea in the shape of a grayish, granulating mass, the conjunctiva was

Dr. Gutmann's Paper.

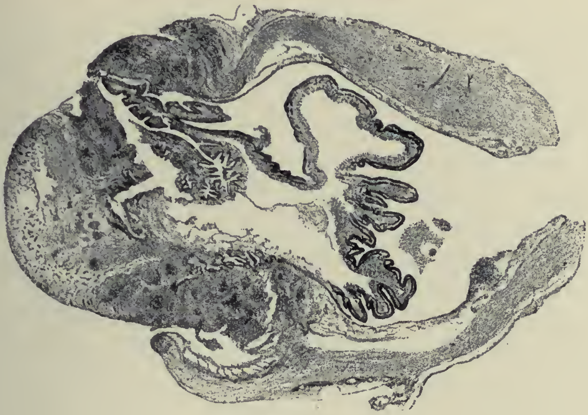

FIG. 1.

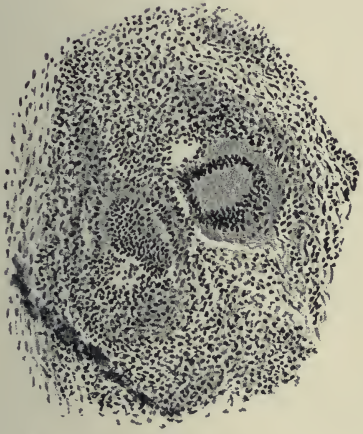

FIG. 2.

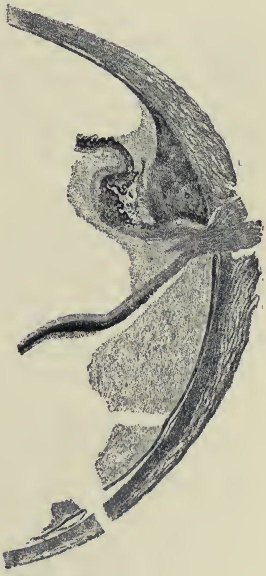

FIG. 3.

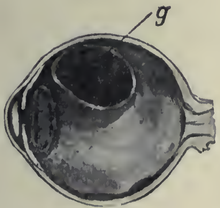

FIG. 4.

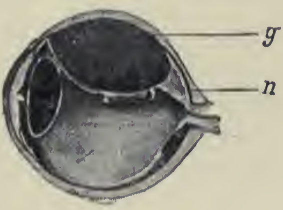

FIG. 5.

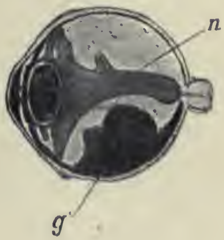

FIG. 6.

greatly injected, and the eye was very tender to the touch. As the tumor grew, a second, smaller tumor sprang from its summit in the shape of a grayish bunch sharply defined as the original had been.

The left eye also changed greatly in appearance, with numerous fine iritic adhesions, delicate pupillary exudate, and, in the tissue of the iris, minute grayish nodules, especially in the nasal half. The ophthalmoscopic image was not so clear as before, but the choroidal tumor had evidently increased in size during the month since first seen. The left eye was of normal shape and appearance, but the iridic nodules had entirely disappeared from view. The optic papilla seemed much swollen, and was partly hidden by the increased growth of the choroidal tumor, which looked very nodular, and was whitish-gray in color, with walls of rather a bluish-gray appearance.

The child gradually becoming more and more unmanageable, evidently from the pain caused in the right eye by the enlarging tumor, enucleation seemed justified in order to save his life, and was safely done on the 10th of June. The patient remained perfectly well until the middle of July, when he was taken down with the measles, and soon died.

The autopsy showed an exanthema over most of the body, intestines swollen with gas, heart large and relaxed, both ventricles very soft, the left lung wholly caseous and interspersed with gray nodules. The spleen is also much enlarged, and exhibits many cheesy tubercles. The left kidney also contains tubercles, as well as the liver, which is fatty and very tuberculous.

The arachnoid membrane is much injected, and the left *corpus striatum* contains numerous cheesy tubercles. There are none of these in the arachnoid itself. Both optic nerves are flattened out, but are not white.

After death, the left eye was enucleated, both globes were laid in Müller's fluid, and later the right eye was divided by a meridional section into a nasal upper and a temporal lower half, and imbedded in celloidin, and then cut in serial sections.

The general appearance of the anterior portion of the right eye is shown in Fig. 1, where we see the cornea, anterior chamber, and anterior portion of the iris represented by a chestnut-shaped tumor. A small part of the cornea remains pushed inward and beneath, the anterior chamber is wanting, and only the pigment layer of the iris remains. The retina and choroid are seen folded together in the centre of the eye, which collapsed owing to accidental opening of the globe during the enucleation, and as a result of which mischance also the optic nerve is missing.

The microscopic examination shows small round cells with mostly roundish nuclei, the cells lying very close together, and interspersed with occasional giant cells (see Fig. 2).

The left eye after being treated about as the other had been, showed near and just above the optic-nerve entrance and in the choroid a small tumor by which the retina was forced into the posterior chamber and detached. The choroid at the actual seat of the tumor is substantially destroyed. The tumor is composed of round cells and a few giant cells. The optic nerve where it abuts on the seat and vicinity of the tumor shows inflammatory infiltration with cells.

I would also remark that, in another section, from a different part of the globe, a second smaller choroidal tumor identical with the first was seen.

Figure 3 shows the larger of the two choroidal tumors. No trace of tubercle bacilli could be anywhere discovered either in the body or in the eyes, but despite their absence we feel perfectly justified in diagnosticating, from their presence in so many other organs of the body, tuberculosis of the iris of the right eye, and of the choroid of the left eye.

This case, then, may be added to the three already published of bilateral tuberculosis of the eyes. That of Haab[1] was one of late tuberculous disease of the second eye, in a tuberculous patient with the first eye affected with tuberculosis, but never enucleated. Castenholtz[2] reports tuberculous disease of an eye some months after the enucleation of the first primary tuberculous eye, and Hirschberg showed a case[3] in which from all the symptoms a solitary tubercle of the cerebellum was diagnosed, and in which was discovered later a small tuberculous focus in the choroid of both eyes.

Haab's case, therefore, was one of tuberculous disease of the conjunctiva and choroid of the first affected eye, as proved at the autopsy, whilst the other eye had an optic neuritis the nature of which was revealed by the examination after death. Castenholtz's case was not one of iris tuberculosis of the one eye which was enucleated, whilst later presumably the same disease produced blindness in the second eye. But an autopsy could only be made on the enucleated eye. So, too, in Hirschberg's case we have nothing but the clinical history; the ophthalmoscope showing in both eyes, just above the papilla, tuberculous deposits in the choroid, and bilateral choked disc.

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[1] " Die Tuberkulose des Auges," *Arch. f. Ophthal.*, vol. xxv., part 4, p. 221.

[2] *C. f. A.*, vol viii., p. 456.

[3] *Neurologisches Centralblatt*, i., p. 553.

Consequently, the case which I have just reported is *actually unique*, for in both eyes tuberculosis was not only observed during the life of the patient, but confirmed on the post-mortem table.

On the following five cases of sarcoma of the choroid, three were observed in eyes with good vision, and two in eyes that were blind.

Case 1.—On the 16th of September, 1890, a lady of thirty-two complained of a mist before the left eye of one month's duration. She had been married two years, and since then had suffered from a chronic nasal catarrh which resisted all treatment. Lately she had been curetted for endometritis, which, in connection with gonorrhœal vaginitis and cystitis, came on soon after her marriage. Otherwise than this, the patient has always been perfectly well, and there is no history of tumors in the family except that a sister had a small nævus removed some years before.

The condition of the eyes is: Vision perfect in each eye. The right eye is normal. The left eye shows loss of a segment of the visual field in the temporal superior quadrant. The eye, externally, is free from irritation and tension is normal. The ophthalmoscope shows hyperæmia of the papilla, and very fine opacities in the anterior portion of the vitreous body.

Just below the papilla is a whitish reflex which is seen to project into the vitreous about + 11 D. On dilating the pupil the surface of the tumor appears irregular, with elevations and depressions, whilst the whole tumor is dotted with pigment granules. The color of the tumor changes here and there to a yellow hue, and the surface is marked with numerous tortuous vessels. The concave reflector at 10 *cm* distance shows that the tumor reaches forward into the ciliary region.

Judging from the appearances, a pigmented sarcoma of the choroid was diagnosticated.

Examination of the other organs was negative. As there was a suspicion of a gummatous growth, since the husband had previously had syphilis, and had been treated by inunctions, and additionally as the eye had normal vision, an energetic inunction course was at once begun with the hope of saving the eye. But as this proved after some months of no avail, the field of vision showing a visible extension of the disease, enucleation was advised and performed in the following November. The eye was first placed in chromic-acid solution, then in Müller's fluid, and later wrapped in a guttapercha cloth and frozen. After being divided the Müller's fluid was washed out with a 50 per cent. solution of chloral hydrate, and the sections were treated with hæmatoxylin-eosin and borax-carmine.

The macroscopical appearance is well shown in Fig. 4, where we see a bean-shaped tumor in a capsule near the tips of the ciliary processes, with its summit directed toward the macula lutea. The surface of the tumor is separated from the posterior surface of the lens by a small cavity filled with coagulated vitreous. The interior of the tumor shows minute cavities surrounded by grayish tissue. The centre of the structure is spongy and black. The whole tumor measures 11 *mm* by about 9 *mm*. The rest of the eye appears normal.

Microscopically, the conjunctiva, cornea, iris, lens, vitreous, and optic nerve are normal. The tumor is chiefly composed of unpigmented small spindle-shaped and round cells with large oval and round nuclei and a scanty, finely-granular intercellular substance which is spread out into a reticulated meshwork. It grows with a broad base from the choroid, which is everywhere separated from the retina. The choroid is at places seen to penetrate the substance of the tumor in the form of broad striæ, with cells mostly small, but occasionally giant cells which lie along the sides of the blood-vessels, which pass through the tumor.

The minute cavities in the tumor contain cells which are elongated and suggestive of amœboid movements.

The retina is at places infiltrated with small pigmented cells, and occasionally so universally penetrated with tumor cells that of its actual structure nothing remains.

To sum up, the tumor evidently developed from the unpigmented round and spindle-shaped cells in the external layer of the choroid, whilst the inner layers are partly preserved above the tumor and form a sort of pigmented capsule, so that our diagnosis must be one of pigmented sarcoma of the choroid.

Case 2.—A young lady of thirty-two came to the clinic January 10, 1891, complaining of growing more and more short-sighted during the past month in the right eye, and at the same time seeing what she called a shadow on the right-hand side of objects. She was unable to say whether or not the shadow had of late increased in extent. There was no pain. The left eye had always been poorer than the right, the one now affected. The patient's family history was not good, her father dying two years before of cancer of the liver, after previously suffering from a tumor of some sort in the right eye. Prof. Schoeler, who was at that time in charge of the patient, wrote me that, although the eye was not enucleated, he had no doubt of the tumor being a melanoma of the choroid.

Present condition : O D is apparently normal externally, and with + 1.50 reads $\frac{15}{20}$, and diamond type. The visual field is contracted outward and upward. The tension of the globe is normal.

The left eye has corneal opacities, is very hyperopic, and yet obtains with the best lens + 3 D S only $\frac{1}{18}$ of normal vision. Vision is increased to $\frac{1}{6}$ by adding to the above lens a + 3 D C axis 90. The patient reads with much difficulty Schweigger's type 3, and, with the above compound lens, Schweigger 1.3 at 15 *cm.*

The ophthalmoscopic image of O S is normal, that of O D shows a grayish reflex by ordinary daylight, and with the lamp a brownish mass behind the lens apparently arising from the ciliary region and covering the upper $\frac{2}{3}$ of the pupil. The anterior chamber seems much flattened toward the nasal side and downward.

On using lateral illumination, and still better by transillumination of the eye, the tumor is plainly visible when the patient looks in and down. With a magnifying lens a striated surface can be distinctly made out, and on the top of the tumor a gray fold, over which run fine vessels, which gradually are lost in the tissues of the growth. The gray fold passes backward into a dappled membrane, also covered with vessels. It would almost seem as if this gray tissue were the detached retina.

Farther backward we see a grayish retina, pigment patches in the choroid, and a portion of the optic papilla, the rest being covered with the large tumor. With the exception of very fine opacities in the vitreous the interior of the eye seems otherwise healthy.

It was with regret, this being the better eye of the two, that, after mature deliberation, I advised enucleation, which was consented to, and the operation performed on the 16th of January.

After the eye had been hardened and treated as usual, it was divided in such a way as to make a good section of the tumor *in situ*, together with the various structures of the globe, and the general appearance is shown in Figure 5.

In the nasal posterior quadrant of the globe we see an oval projecting tumor of firm consistence and dark-brown color. It rests on the sclera, extends forward to the angle of the anterior chamber and backward to within 6 *mm* of the optic-nerve entrance. Its greatest length is 14 *mm* and its greatest height 10 *mm*. The surface of the tumor is rather flattened in front and covered with the choroid and retina, whilst behind only the choroid follows the contour of the tumor, whilst the retina rises in a wavy fold into the vitreous chamber, and is reapplied again to the choroid only near the optic nerve.

The microscopic examination shows an alveolar structure, composed of thickly packed, small, round cells, together with small, round cells with large round nuclei, which bear considerable resemblance to smooth muscle-cells; there is also a finely granular substance with fibrous connective tissue. The chief mass of the tumor is pigmented darkly brown. The pigment is contained in the shape of extremely fine granules in the spindle-shaped cells, and in coarser globules in large giant cells of regular and irregular rounded contours. Occasionally the pigment forms large clumps in the tissue of the tumor.

The sclera as well as the ciliary processes contains some pigment cells, whilst the ciliary body itself is infiltrated with closely packed but mostly unpigmented tumor cells. The cellular infiltration extends to the lig. pectin. and Descemet's membrane.

The choroid is perfectly preserved in the posterior fifth of the tumor only, where we can recognize all of its layers. But from there forward the layers, one after another, become lost in the tumor.

The retina, aside from the above-mentioned detachment, shows nothing abnormal except a few pigmented and flattened tumor cells in its external layers, which toward the ora serrata become more numerous and there extend deeper and deeper into the inner layers of the retina. And just behind the region of the ora serrata we see vacuoles between Müller's radiating fibres.

The microscopic examination showing a pigmented spindle-celled sarcoma of the choroid, we find justification for the enucleation of the patient's better eye, in having so far preserved the patient from death from melano-sarcoma of some other organ, as in the case of her father.

Examination a few days ago shows that the patient is able to earn a living with the sight of the other eye, which, with lenses as before, brings V to $\frac{1}{4}$ and Schweigger 1.25 type at 8″.

CASE 3.—Mrs. H., æt. fifty-four, seen December 26, 1891, has observed before both eyes, but especially before the right, a shadow which she describes as being in the upper portion of the field of vision, and gradually increasing in size. The present condition is O D $\frac{20}{100}$, and with + 2 D S $\frac{20}{40}$. With + 3 D S she reads fine print easily. O S V. = $\frac{20}{100}$. + 2 D C axis 45° $\frac{20}{50}$; adding + 3 D S, fine type.

The field of the left eye is normal, but that of the right eye shows a defect in the upper half, reaching almost to the centre.

The left eye is normal except for hyperopic astigmatism.

After dilating the right pupil one sees just behind the lens a grayish reflex, and by transillumination in the depth of the eye a yellowish mass in a gray envelope covered with tortuous vessels, and showing brighter and darker folds on focal illumination, resembling a retinal detachment. This gray vascular envelope is plainly enough the detached retina, but it is not like a typical detachment, movable with the motion of the eye. The folds do not float about, but remain fixed and immovable when the eye moves to and fro. The vitreous contains a large number of fine opacities. The papilla, however, is plainly visible, despite these, and shows a refraction of + 2 D S. The summit of the tumor similarly measured is + 12 D S.

A diagnosis of choroidal tumor, probably a sarcoma, was made.

Examination of the body showed emphysema of the lungs, liver pressed somewhat downward, some ozæna. Reflecting on the latter point and its possible origin from syphilis, iodide of potassium was given in large doses, and also inunctions freely employed. This being fruitless, enucleation was advised and performed March 4, 1892.

After the usual treatment and sections the appearance was as shown in Fig. 6.

The lower half of the globe contains a roundish tumor with a broad base and of grayish-brown color, rather firm in consistency and rising to the middle of the vitreous chamber, measuring 22 *mm* across and 9 high. Right over the summit of the tumor and passing through the centre of the vitreous lies the totally detached retina which must have become detached during the enucleation, as the day before the upper half of the retina was *in situ*, as proved by tests of the visual field, and demonstrated by the opthalmoscope. In front of this detachment is a grayish-white mass presumably of coagulated albuminous bodies, and the same sort of tissue fills the gaps between the other portions of the tumor and the surface of the retina.

The microscopic examinations show the tumor to consist of closely-packed brownish spindle cells with occasionally finely-granular connective tissue. The nuclei, which stain blue with hæmatoxylin, are oval. The centre of the tumor has abundant pigmented round cells with small round nuclei. Here and there are scattered clumps of pigment in the tissue. There are but few blood-vessels, chiefly veins.

The choroid is totally absorbed in the tumor, except in the lower half of the anterior portion of the surface of the tumor, where we can see the lamina vitrea, upon which lies the pigment epithelium of the retina, infiltrated with pigment cells from the tumor. The posterior surface of the tumor also shows a trace of the choroid, but it is soon lost in the tissues of the tumor itself.

The clinical diagnosis of a malignant tumor of the choroid is consequently confirmed by the anatomical examination, and the case is one of pigmented spindle-celled sarcoma of the choroid.

The early enucleation of the eye was therefore demanded although it could read the finest type. A year and a half have passed away and there has been no sign of a relapse in any part of the patient's body.

Case 4.—April 21, 1890, Mr. H. applied for the relief of pain in his inflamed right eye. The inflammation came on a day or two before, and was already very violent. The patient first noticed four weeks before that he could no longer see with that eye. The cornea was very hazy, anterior chamber abolished, and the pupil contracted with adhesions. The lens was apparently opaque, and all that could be seen of the interior of the eye with the ophthalmoscope was a darkish brown reflex. Just above the sclero-corneal junction was a dark brown spot, and a slight ectasia. Tension was +3. The left eye was normal.

We diagnosticated secondary glaucoma of the right eye, probably due to an intra-ocular tumor. Examination of the internal organs of the body showed no abnormity and the urine was free from albumin, sugar, and melanin. Enucleation was performed April 23d.

After being treated in the usual way the globe was opened and many sections made, the macroscopic condition of some being shown in Fig. 1, Plate IX.

The anterior chamber is partly filled with coagula, and in the upper half flattened by the pushing of the iris against the apparently normal cornea. The lens is subluxated upward, and touches only the upper pupillary margin, and its upper half is so pressed forward that it seems smaller at the top than at the bottom.

The retina shows a funnel-shaped detachment. The upper part of the globe is filled with a brownish tumor measuring 14 *mm* in height and about 20 *mm* in greatest breadth.

The microscopic examination shows in the anterior chamber on Descemet's membrane a finely granular mass which in the upper portion of the chamber is interspersed with numerous closely packed, and then again irregularly-formed masses of pigment. A similar mass fills the space between the upper half of the iris and the cornea and the superior angle of the anterior chamber. It contains dark-brown pigmented cells and clumps of pigment which lie close beside one another in smaller and larger groups. The pigment itself is minutely granular. The ciliary body and processes are thinned by atrophy.

The fibres of the lens in the nuclear region are well preserved, but near the anterior capsule and still more near the posterior they are separated by fissures. Within these, we see globular bodies reminding one of fat-cells.

The tumor is composed mostly of spindle-shaped large and small pigment cells in which the coloring matter is contained in very minute yellowish-brown granules which renders the nucleus invisible, and of abundant inter-cellular substance. Larger pigment heaps lie scattered about. The tumor is marked by numerous fissures, cavities filled with blood corpuscles, and smaller cavities of which but few seem to possess a thin internal envelope.

The sclera is normal except for a small space at the base of the tumor where the growth has invaded it.

The choroid is almost totally destroyed by the tumor, but here and there traces of the lamina vitrea and the stroma can be seen infiltrated with cells.

The detached retina is atrophied, only the nuclear layers remaining in the least preserved.

The diagnosis of probably a malignant tumor was thus confirmed by the microscopic examination, the pigmented spindle-celled sarcoma of the choroid having grown from the choroid upward and backward and then pressed upward and forward as is shown by the position of the dislocated lens.

The pigmented tumor elements in the anterior chamber were probably drawn there by suction from the tumor by the currents of the eye.

Case 5.—Mr. G, æt. fifty-six, consulted me in November, 1890, for inflammation of the right eye which had begun only four days before. Three years before the eye had gradually become blind within the space of three months, and a year ago the eye had been inflamed for some weeks, but this gradually subsided and the eye was quiet. No treatment was given at either time.

The anterior portion of the eye looks flattened and there is much circumcorneal injection. The cornea is partially necrotic, and covered with a dirty mass, which extends back into the anterior chamber, covers the pupil, and prevents any examination of the interior of the eye. The upper portion of the ciliary body is painful to the touch, tension is increased, and the eye is blind.

More careful investigation showed that three years before the patient had been to an eye clinic where amaurosis dependent on detachment, accompanied with increased tension, had been diagnosticated. The patient did not, however, return for treatment.

Enucleation was at once urged on the presumption that the case was one of intra-ocular (probably malignant) tumor which had excited the irido-cyclitis and glaucomatous symptoms. The operation was performed on November 21st.

The freshly-enucleated globe showed just in front of the optic-nerve entrance and above the horizontal meridian a small pin-head-sized spot in the sclera, rising a little above its surface.

Presuming that this spot indicated a tumor pressing forward through the sclera, the eye was divided in such a way as to show the interior to the best advantage, that is to say, into two portions, one larger than the other, and represented in Figure 2, Plate IX.

The tumor occupies two thirds of the interior of the eye, and is attached by a broad base to the sclera, which it penetrates near the optic-nerve entrance. It fills the entire space between the optic nerve and the lens, with the exception of one or two small fissures. Its color is dark brown, and it is very firm in consistence. It measures about 16 *mm* longitudinally and 15 *mm* transversely.

The upper surface of the tumor is wavy, and between this and the lens is a grayish-white mass completely surrounding the lens, and filling the space between the surface of the tumor, iris, and ciliary body. Between the pupil and the cornea lies a grayish, yellow mass.

Microscopic examination shows the chief mass of the tumor to consist of dark-brown, pigmented, closely-packed, small, spindle cells with oval nuclei, and occasional finely granular and fibrous intercellular substance. Interspersed, are unpigmented larger and smaller round and spindle cells, the former with round, the latter with oval nuclei. There are also many large pigment cells resembling giant cells. The pigment is in the shape of the very finest granules. Toward the surface these large pigment cells are flatter and more oval. The surface of the tumor exhibits numerous veins, the wall on one side or the other being broken by pressure. At the spot where the tumor has perforated the sclera it presses teat-like forward into the episcleral tissue.

The choroid is, as is usual in these tumors, present in some portions of the tissue, and then again entirely destroyed except the lamina vitrea, which is almost everywhere preserved. The retina is detached, and in some portions infiltrated with the pigmented cells of the tumor.

The lens, whose capsular epithelium is well preserved, contains many fissures between the fibres, in which lie larger and smaller, occasionally confluent, homogeneous, nine-pin-shaped structures, and in the anterior and posterior portions of the cortex one sees numerous vacuoles, indicating the formation of cataract.

The iris and ciliary body are atrophic, whilst the sclera at the spot of perforation is marked with an infiltration of pigment cells from the tumor.

The cornea and bulbar conjunctiva are slightly infiltrated with pigment cells, whilst there are also traces of cicatricial formation and thickening.

The anatomical investigation, therefore, reveals a pigmented spindle-celled sarcoma of the choroid, which at one spot has perforated the sclera, and the clinical diagnosis of a malignant tumor is confirmed. Unfortunately, enucleation could not be performed until after the tumor had perforated the sclera. The patient never returned for examination, but investigation brought out the fact that he returned home and died in 1893, presumably of cancer of the liver.

The cases of choroidal sarcoma here reported confirm the opinion expressed by Freudenthal,[1] that the prognosis in this disease is not so hopeless as it has generally been regarded, provided that the enucleation of the eye can be done in an early stage.

Fuchs has shown in his monograph[2] that relapses occur most frequently during the first four years after the operation, so that an eye that has remained free for that length of time from relapses will probably forever remain free from any farther attacks. Metastasis, according to the same author, generally occur within two years from the time of operation, and he never knew of a case in which metastasis occurred later than five years.

In the first three of my cases five years, in the second four, and in the third three and a half years have passed since the enucleation, and there has been neither relapse nor metastasis. In all three cases I have removed the seeing eye, in two cases even the better seeing eye, after the diagnosis had been established. The second case is of interest owing to the evident hereditary influence, the father of the patient suffering from choroidal sarcoma, and of the right eye too, though it was not removed. He died from metastasis in the liver. The fourth case, which I saw in the second stage only, that is, after the eye had become blind, may be regarded as cured, since five years have passed since the operation, and the patient has remained well to this day. The fifth case came too late,—during the third stage,—at which time the tumor had perforated the sclera, though but a trifle in extent. There was indeed no local relapse, but in the third year after the enucleation the patient died from metastasis in the liver.

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[1] "Ueber das Sarcom des Uvealtractus," *Archiv f. Ophthal.*, xxxvii.

[2] *Das Sarcom des Uvealtractus*, Wien, 1882.

It is very rare that one has the chance to operate at so early a stage as in my first three cases. Amongst 221 cases of sarcoma of the choroid collected in Fuchs's monograph, there were only four with reasonably good sight just previous to enucleation, but it was in no case so good as in mine. In his own list of 22 patients there was none with useful vision in the eye enucleated. Freudenthal saw fairly good vision, from $\frac{1}{5}$ to $\frac{1}{10}$, in four of his 24 cases, and one with vision of $\frac{2}{3}$ and this one died from a local relapse some ten years later. One case with vision $\frac{1}{5}$ died four years later from metastasis. Fuchs grants only six per cent. of favorable results, but Hirschberg,[1] as well as Freudenthal, claims thirty-eight per cent. of favorable results.

After due consideration of the two cases of Freudenthal, it seems to me I have the right to call "cured" the first four cases here communicated, and to express the hope that the cure is definite.

Description of the Drawings on Text-plate VII and Plate IX.

Text-plate, Fig. 1.—Meridional section through the anterior portion of the right eye of a child. (Tuberculosis of the eye.) Direction of the section from outward and upward to inward and downward. Temporal lower half.

Fig. 2.—Tuberculous infiltration in the anterior portion of the same eye. (Giant cell and neighborhood.) Zeiss eye-piece 8, Objective A, A.

Fig. 3.—Macroscopic view. (Lens.) Sagittal section through the papilla of the left eye (temporal half) of the same patient.

Fig. 4.—Choroidal sarcoma (Case 1). g = Tumor.

Fig. 5.—Choroidal sarcoma (Case 2). g = Tumor. n = Detached retina.

Fig. 6.—Choroidal tumor (Case 3). g = Tumor. n = Detached retina.

Pl. IX., Fig. 1.—Choroidal tumor (Case 4). g = Tumor. n = Retinal detachment. l = Lens dislocated upward. v = Pigmented tumor-elements in the anterior chamber lying on the upper half of the iris.

Pl. IX., Fig. 2.—Choroidal tumor (Case 5). g = Tumor. n = Retinal detachment. l = Lens.

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[1] "Zur Prognosis des Aderhautsarcoms," *Virchow's Archiv*, Band xi. ("Achte Folge," Band x.), Heft 1.

OCULAR PARALYSES OCCURRING IN THE COURSE OF NEPHRITIS. WITH REPORT OF CASES.

By JOHN DUNN, M.D., Richmond, Va.

KNIES, *The Eye in General Disease*, 1895, p. 307, says: "Little is found in literature concerning paralyses of the ocular muscles in albuminuria. . . . They are so frequent, however, that in every case of sudden, or rapidly developing paralysis of the ocular muscles with the character of basilar, root or nuclear paralysis, the urine should be examined for albumin. The cause generally appears to consist of a hemorrhage in the region of the nerve roots or nuclei, possibly even in the nerve itself."

He then mentions briefly three cases of such ocular paralysis seen by him. Dufour, *Annales d'Oculistique*, March, 1890, tabulates 220 reported cases of nuclear paralysis of the ocular muscles; albuminuria is mentioned as coexisting in but one instance, and in this one it was "transient"—nor has search through the special writings within my reach revealed another mention of the coexistence of ocular paralysis and albuminuria, except the case recently reported by Hensell. In Knies's three cases and in Finlayson's one (*Jahr. f. Aug.*, 1897, p. 240) cited by Knies, the fundus showed no evidences of albuminuric retinitis. The following three cases, then, do not lack in interest.

Case i.—M. R., aged thirty-six, farmer, hard drinker, was seen first April 9, 1897. Past history imperfect; patient had suffered with severe headaches off and on for six weeks; for the past three weeks his eyesight had been getting bad, till within the last few days he was no longer able to read. Examination of his eyes showed a slight degree of divergence for both. Patient was unable to move either eye in any direction, up, down, in or out, nor did the effort to move the eye cause the slightest rotation of the ball. There was no ptosis, the patient having perfect control of both upper lids. When told to close his eyes tightly and then open them, very slight motion was communicated to the eyeballs at the moment of the lifting of the upper lids; pupils responded to light both directly and consensually. There was absolute loss of motion of the pupil in the accommodative effort. As all power of convergence was lost, the experiment was made of holding a pencil some distance from the eye and gradually bringing it close before the pupil—the pupil remained stationary. Power of reading was entirely lost; there was, so far as I could decide, complete paralysis of the ciliary muscle. Vision $\frac{8}{200}$ O. D. $\frac{7}{200}$ O. S.; pupils dilated under atropia. Examination of the fundus revealed œdema of the retina, together with numerous hemorrhages and the characteristic white patches of albuminuric retinitis. Urine contained both albumin and casts. No other paralyses than those mentioned were demonstrable. Ten days later the patient was seen. The condition of the eyes was unchanged save that a slight tremulous motion was imparted to the balls when an effort was made to turn them in any direction. On June 3d œdema of the ankles and lungs was present. Vision, however, had risen to $\frac{16}{50}$ O. D. and O. S. Accommodation was no longer paralyzed; slight movement of the interni was now possible, especially noticeable with the accommodative effort; other muscles as on April 9th. About two weeks later the patient died.

CASE 2.—M. J., aged sixty-nine, seen April 14, 1897. He complained of dimness of vision, which dated back five days and which followed an attack of "indescribable sensations" in the head, which left him for a few moments mentally "much confused." Examination of the eyes revealed *paralysis of the right superior oblique.* Vision O. D. with a + 1½ D sph. = $\frac{16}{16}$; O. S. = $\frac{16}{25}$. Media clear. Both retinal arteries and veins contracted. No hemorrhages in either fundus. The region of the macula in both eyes showed a more or less circular area of retinal degeneration, more extensive in the left, where it was as large or larger than the optic disc. The changes consisted of small, yellowish areas between which and over which the retina appeared healthy. Urine showed neither albumin nor sugar, but *epithelial casts.* The patient stated that he voided his urine frequently and in large quantities. By June 5th the paralysis had disappeared. Treatment—iodide of potash.

Case 3.—M. A., aged forty-five, seen first in the spring of 1896. Spasmodic tic affecting chiefly the *right oculo-facial fibres*, although the elevators of lip participated to some extent in the spasmodic movements. Retinal arteries and veins both showed considerable contraction when patient was first seen. There was also a small retinal hemorrhage present. Tests gave urine free from albumin, but containing *hyaline casts*. Patient has now been under observation for one year, during which time there have appeared œdema of the ankles and lower portions of the lungs and hemorrhage into the *conjunctiva*. The spasmodic tic has persisted and is most annoying.

In Case 1 the history, as well as the changes in the fundus, suggest that there existed in the region of the nuclei of the third, fourth, and sixth nerves, a condition not dissimilar to that shown in the retina, viz:—œdema, hemorrhages, and areas of nerve-nuclei degeneration. The nuclei involved present an interesting picture—complete ophthalmoplegia externa, except for the levat. sup. palp., and to this is added paralysis of the ciliary muscle. Inasmuch as the visual acuity was so much reduced, it may be doubted whether ciliary paralysis existed. If the associated movement of the iris in accommodation occurs in a purely mechanical manner, *i. e.*, as the result of blood being forced into it by the contraction of the ciliary body, then there existed paralysis of the accommodation, for no movement of the iris occurred when objects were brought close before the eye, and this, although the double response to light was retained. This mixed form of ophthalmoplegia bears out strikingly the suggestion of Darkschewitch, advocated by Knies, that the accommodation nucleus is separate from that regulating the movements of the pupil, and is situated behind that of the levator and nearer the other massed nuclei of the third nerve. In this case we have ophthalmoplegia occurring in the course of *acute nephritis accompanied by albuminuric retinitis*.

In Case 2 we have an example of an ocular paralysis, associated with retinal changes and *chronic nephritis*, the latter established by the presence of epithelial casts in the urine. In this case, as well as in Case 3, the importance of microscopical examination of the urine is shown, for in neither instance was albumin present in the urine at the time of the implication of the ocular muscle. In both Case 2 and Case 3 we find retinal changes: in the former, degeneration of the retina in the region of the macula; in the latter, retinal hemorrhage; in both, contraction of the retinal vessels. In both it is likely that the muscular affection was due to hemorrhage.

In Case 2 we find complete recovery of muscular action following paralysis due to hemorrhage occurring in the course of chronic nephritis; this hemorrhage was either into the nucleus of the fourth nerve, or into its root fibres in their downward course, and this latter is, perhaps, the more likely because of the concomitant mental confusion at the time of the apoplectic attack. It may be objected that in Case 3 we have not to do with a case of paralysis of an ocular muscle. The case, however, has here been reported inasmuch as it adds to the details of the subject in hand. In Case 3 it seems not improbable that the seat of trouble is the small vessels which supply the body of the facial nerve. The case is further interesting, in this connection, as showing the coexistence of chronic Bright's disease, retinal changes, and convulsive tic affecting the oculo-facial fibres. It would seem fair to infer from the above cases that the ocular paralysis accompanying nephritis may have two causes. The first, that shown in Case 1, a localized albuminuric cerebritis; the second, that shown by Cases 2 and 3, hemorrhage from vessels whose walls have undergone degeneration. In old persons, where there coexist an ocular paralysis and retinal hemorrhages, while we may suspect accompanying kidney disease, it does not always exist, and it is well, in all such cases, to examine the urine before a full diagnosis is given. The following is a case in point.

Mr. A., aged sixty-eight, on May 4th, while out walking, suddenly became unconscious, and remained so for some minutes. Examination a few days later revealed *a complete paralysis of the right third nerve and a retinal hemorrhage*. The urine, examined at this time and later, proved to be normal. When seen, about two months after the attack, the paralysis remained complete. In September, 1897, however, considerable motion had returned to the paralyzed muscles.

PHYSIOLOGICAL AND HYSTERICAL DIPLOPIA.

By Dr. LIEBRECHT, Hamburg.

Translated and slightly abridged by Dr. Duane, New York.

FOR some time I have been engaged in the study of cases of hysterical diplopia, a condition which, since the labors of Charcot and his pupils, has been one of particular interest.

One characteristic of diplopia in hysterical patients I should like particularly to emphasize in passing. This is the exceedingly slight subjective disturbance that such diplopia causes; the patient alleging that it is present only part of the time, or in connection with special objects, or that it gives him so little trouble compared with his other symptoms, that he may even fail to realize its existence until his attention is called to it.

The more I examined these cases, the more was I surprised to find in what a very large proportion diplopia developed as soon as the eyes were turned in certain directions. I found, in fact, diplopia in almost all that I examined. I at first ascribed this to the special nervous condition present, and for purposes of comparison proceeded to examine a number of persons unaffected with hysteria. I used for this purpose fifty dispensary patients of all ages, taking them as they came. This examination brought to light the fact, so far apparently overlooked,[1] that *for certain positions of the*

[[1] This is hardly correct. For example, Alling (these Archives, xxiv., 3, p. 374), in speaking of 56 normal cases that he examined, says: "Diplopia at a distance at the periphery of the field is of common occurrence," and the translator of the article (*ib.*, xxiv., 4, p. 496) says: "Diplopia occurring at the limits of the field of fixation is physiological."—Translator.]

eyes diplopia is a physiological phenomenon, and that there is only a very small proportion of persons (6 out of 50) in whom such a diplopia cannot be evoked by suitable means.

The examinations gave all pretty much the same results, so that I will adduce only three cases as samples. The first two represent the comparatively rare form in which the distance between the double images is great, while the third case may be regarded as typical.

It may be added that in none of the cases was there a relative divergence for distance, or anything but a slight divergence for near. The light that served as a test object was placed at a distance of 3 *m*, and, for the better recognition of the double images, was backed by a large black screen.

CASE 1.—Mrs. Behrend, aged fifty-four. R. and L., Hm. 3 D; $V = \frac{6}{6}$. Never had diplopia.

In straightforward directions of the gaze, single vision both with and without the red glass. If the light is kept fixed and the head is turned 20° either to the right or to the left, diplopia occurs. Double images on a level, homonymous, and separating as the head is turned laterally. Their greatest distance is 25 *cm* when the eyes are turned to the right, and 50 *cm* when the eyes are turned to the left. When the gaze is directed downwards, there is likewise homonymous diplopia, but the image of the right eye is lower, and is tilted away from the other image; and when the gaze is directed upwards, there is homonymous diplopia, and the image of the right eye is higher, appears farther off than the image of the left, and is tilted to the right.

CASE 2.—Christine Christensen, aged thirty. With the eyes in the mid-position (gaze directed straightforwards), no diplopia. When the eyes are rotated 30° either to the right or left, homonymous diplopia ensues, the double images being $\frac{1}{2}$ *m* apart when the gaze is directed far to the left, and 1 *m* when the gaze is directed to the right. The double images are not constantly present, there being sometimes single vision up to the extreme limits of the lateral excursion.

When the gaze is directed up or down (by movements of the head, the object of fixation remaining still), there is a homonymous diplopia, the images being 10 *cm* apart, and on the same level with each other and parallel.

The ordinary distance between the double images was not as great as in the two cases above cited, although it often reached 20–30 *cm.* The most usual distance was 5–10 *cm*, as in the following:

Case 3.—Hünecke, Dietrich, aged forty-six. R. and L., E.; V = $\frac{6}{6}$. Without red glass very slight homonymous diplopia when the eyes were directed down; no diplopia in other parts of the field. With the red glass, homonymous diplopia when the gaze was directed to the right or left. Maximum distance between the double images 5 *cm.* Homonymous diplopia also in looking up or down, the image of the left eye in both instances being somewhat lower than that of the right. No tipping of either image.

These three examples give an idea of the way in which the diplopia developed and of its character. It appears when associated movements of the eyes are made either in the vertical or horizontal direction; usually not until the excursion movements have been carried nearly to the extreme limit of which the eye is capable, but sometimes occurring when the eyes have made but a comparatively slight excursion from the primary position.

A peculiarity of this diplopia is that *it never makes its appearance spontaneously;* but is made evident only by an appropriate examination. In some cases the double images are noticed only when the patient's attention has been directed to them. When once observed they are usually found to persist through a considerable portion of the arc which the eye describes in passing from the extreme limit of its excursion back to the primary position.

Again, the diplopia *in all cases is homonymous and, moreover, is so for all directions of the gaze.* Only in one case were the images crossed; and even here this was the case only when the eyes, were directed upwards; the diplopia elsewhere being homonymous. Furthermore, the *double images do not correspond to a paresis of an ocular muscle, but are to be regarded as due to irregularities in the associated movements of the eyes, resulting from the normal limitation of the ocular excursion movements.* The relation of the double images in the lateral movements of the eyes might, it is true, be explained by a bilateral paresis of the abducens. But that the muscles are not the sole cause of the diplopia is evident from the behavior of the double images when the gaze is directed up or down. As is apparent from the examples cited and from all the other cases also, the relation of the double images for upward and downward directions of the gaze hardly ever corresponds to that due to the paresis of any single muscle, *e. g.*, one of the other obliques, which, on account of the homonymous diplopia, we should naturally suppose[1] to be the muscles concerned. As a matter of fact, almost every case differs from the other. Sometimes the images are on the same level, sometimes the image of the right eye and sometimes that of the left is above, sometimes the lower image is tilted towards and sometimes away from the other, and sometimes the images stand parallel. The diplopia, therefore, is not attributable to a failure of any one muscle, but to an irregularity in the associated movements of the eyes; the correlation of these movements which exists through a large portion of the field of fixation, failing as the eyes get near the limit of their excursion. And it is always the eye that is turned to the temporal side that is the first to give out. This predominance of the forces that act to move the eyes inwards is shown, too, when the gaze is directed up or down, homonymous diplopia being always present under these conditions.

These facts are explainable, I think, by the investigations made by Volkmann, Hering, Donders, and A. Graefe upon the extent of the associated movements. These experimenters all found that the power of inversion of the eye exceeds its power of eversion, the inversion of either eye amounting in extreme associated movements to 44°, while the maximum eversion of its fellow is only 40°. A. Graefe thought that this fact constituted an exception to the law of the strict

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[[1] As Mauthner (Augenmuskellähmungen) pointed out and as experience since has abundantly demonstrated, this inference of the author's is erroneous. While paresis of the obliques is typically associated with homonymous diplopia, there are cases of such paresis in which, owing to complicating conditions, double images are crossed; and *per contra* there are not a few cases of paresis of the superior and inferior recti which, for similar reasons, are associated with homonymous diplopia.—TRANSLATOR.]

equality of associated movements. To my thinking it means that the associated movements of the two eyes are strictly equal for lateral excursions of 40°; but that at this point the eye that is moving outward ceases to move any longer while its fellow keeps on moving for 4° more. In a minority of cases the point at which the interference with associated movements takes place is not at 40° from the primary position, but at some point nearer the latter, *e. g.*, 20° (Case 1) or 30° (Case 2). In these exceptional cases we are probably justified in assuming a weakness of the external rectus; a view which is corroborated by the fact that when one eye was covered the other, it seemed to me, did not move outwards in performing fixation to the same extent or with the same force as usual.

These facts are not only of physiological significance but are also *important from a diagnostic point of view.* As above stated, I myself at first regarded the results I found as pathological until I had extended my investigations to evidently normal subjects. I am persuaded that Guillery in his investigations upon latent disturbances of the eye muscles in tabes has fallen into this same diagnostic error.[1] For, using the same methods that I did, he found that in a large proportion of tabetic patients there was diplopia when the eyes were carried in one or the other lateral direction, and this diplopia he regards as due to pareses of the ocular muscles of tabetic origin, which remain latent for a time, and are then discoverable only by the appropriate examination. He says, too, that in numerous control-experiments made upon healthy persons, he never observed diplopia of this sort. As I have pointed out above, this is a mistake. In these patients the diplopia was not the consequence of the tabes, but had existed all their life. *We should hold fast to the fact that real paralysis of a muscle, no matter how slight, gives rise to diplopia, which the patient, provided he can see well enough to distinguish double images, is always cognizant of spontaneously, so that no examination is necessary to bring them out.*

[[1] See Dr. Guillery's comment upon this statement, appended to this article.—TRANSLATOR.]

II.

The second part of my paper has regard to *hysterical diplopia*, a condition which has many points of contact with physiological diplopia, although it also has peculiarities that distinguish it from the latter as well as from the form of diplopia occurring in ordinary muscular paralysis. Since cases of hysterical diplopia are not very frequently reported and the condition itself receives but brief and summary mention in text-books, I adduce here a few cases of it which will serve to demonstrate the clinical history. I do so the more because they have been under observation for a comparatively long time. I should like to add that in this case as in that of physiological diplopia, the condition did not impress me as being due to a paralysis of one or of several muscles, but to a disturbance of central origin affecting the associated movements of the eyes.

The neurological examinations I owe to the kindness of Dr. Saenger.

CASE I.—Pröhl, Clara, eleven years of age, complains for some weeks of poor sight; can read nothing but the large letters on the blackboard, and nothing at all from the book. Lamplight causes marked dazzling. Neurological examination gives the diagnosis: anæmia and hysteria.

June 28, 1896.—$\frac{R}{L}$ V = $\frac{6}{9}$ (increased by indifferent glasses to $\frac{6}{6}$). Reads Sn. 1.0 (nothing smaller); ultimately, with blue glasses, Sn. 0.5.

Diplopia for two weeks. Diplopia crossed and due to the complete abolition of the capacity for fusing images. Images 15 *cm* apart for all distances of the test-object, from 1 to 5 *m*[1] when the

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[[1] This, if the patient's statements are accepted as accurate, is a very remarkable finding. It means that not only was there an *absolute* divergence for distance (divergence beyond parallelism), but that this absolute divergence increased for near points. This is quite different from the increased exophoria for near points common in insufficiency or actual paralysis of convergence. In these cases the divergence is only relative, *i. e.*, the visual axes actually converge, and even converge more and more as the object looked at is approximated, although even so they fail to converge sufficiently. In the case here given, the visual axes were absolutely divergent, so that for an object situated at 5 *m* they diverged more than 2° beyond parallelism, and for an object situated at 1 *m* they diverged as much as 6° beyond parallelism, *i. e.*, instead of making an attempt to converge as the object was approximated, the eyes actually kept diverging farther and farther apart.—TRANSLATOR.]

eyes are directed straight ahead. When the eyes are directed laterally, the images become approximated and ultimately coalesce.

August 5*th*.—Diplopia persists. Double images, crossed about 15 *cm* apart, when the test-object is 6 *m* distant. Degree of separation of double images remains the same when the eyes are directed laterally, but diminishes as the test-object is approximated to the eyes, being only 2 *cm* where the object is $\frac{1}{2}$ *m* distant. (Relation of the double images entirely different from that observed at the previous examination.)

Neither in the test for double images nor with the cover-test does the eye make any attempt to adjust itself for the object of fixation by changing its position. (Movement of redress absent.) Moreover, a prism of 3°, held base in, unites the double images; held base out, throws them farther apart, *i. e.*, there is complete absence of the natural tendency to fuse double images that are close together. When one eye is covered, the other shows no impairment of motility.

CASE 2.—Wachendorf, Anna, aged thirteen. For a short time past has been unable to read continuously, a veil coming over the words. The print often looks double, and sometimes she has diplopia for distance also. Headache and chromatopsia. Neurological examination reveals marked hysteria.

Oct. 18, 1895.—$V \substack{R \\ L}$ with -0.75 cyl. $= \frac{6}{6}$. Reads Sn. 0.5, but only when brought very close. On Jan. 16, 1896, $V = \frac{6}{24}$; with -0.75 sph. $= \frac{6}{12}$; reads Sn. 0.6 (not 0.5). Visual field somewhat contracted concentrically; contraction becoming much more marked on repeated examinations as the patient tires. No essential interference with the adaptation when tested in a dark room. Homonymous diplopia, the distance between the double images increasing as the eyes are directed laterally, but in the middle line remaining the same for all degrees of approximation of the test-object (from $\frac{1}{2}$ to 5 *m*).

Feb. 9, 1896.—No improvement in subjective symptoms. In the morning, attacks of vertigo and diplopia for distance and near. In the evening, visual hallucinations. R eye, $V = \frac{6}{18}$; with -0.50 sph. $= \frac{6}{6}$; Sn. 0.5 at 7 to 12 *cm*. L eye, $V = \frac{6}{18}$; with -0.75 sph. $= \frac{6}{6}$; Sn. 0.6 (not 0.5). Homonymous diplopia in the middle line; images very close together when the test-object is $\frac{1}{2}$ *m* distant, but fly apart as the test-object is carried off, being separated 20 *cm* when the latter is 5 *m* distant. For any given distance, the degree of separation of the double images is now the same, whether the test-object is in the middle line or carried to one side.

Aug. 23, 1896.— $\frac{R}{L.}$ E ; V = $\frac{6}{6}$; Sn. 0.5. Accommodation normal. No subjective symptoms ; no complaint of diplopia. By objective examination, diplopia can be made out to exist only at the extreme limits of the ocular excursions (both lateral and vertical). Double images homonymous, on a level, and but a short distance apart, *i.e.*, the normal relations are restored (the diplopia exhibiting the physiological character) and the patient is cured.

Case 3.—Wachendorf, Willy, aged twelve, brother of Case 2.

Dec. 12, 1895.—Diplopia for some weeks both for distant objects (especially lights) and for print. As a result, he can read but a short time. For 30 *cm* there is a slight relative divergence of 5–6°. R eye, −0.75 sph., V = $\frac{6}{6}$;. reads Sn. 0.5 with difficulty. L eye, E. V = $\frac{6}{6}$ readily.

Visual field somewhat contracted concentrically ; adaptation-time prolonged. Diplopia in the middle line, crossed for distance, homonymous for near.

Feb. 9, 1896.—R eye, −0.50 cyl., V = $\frac{6}{6}$; convex glasses rejected. L eye, V = $\frac{6}{9}$; with −0.50 cyl., V = $\frac{6}{6}$. Homonymous double images not more than 5 *cm* apart and only apparent when the eyes are turned in the extreme lateral position. No more crossed diplopia.

Case 4.—Behr, Toni, aged twelve. Neurological diagnosis, hystero-neurasthenia. Left pupil more dilated than right. R eye, V = $\frac{6}{24}$; with + 0.50 sph., = $\frac{6}{6}$; for near, Sn. 1.0 (with +0.50 D, Sn. 0.5). L eye, counts fingers held near the eye ; with + 1.50 sph, V = $\frac{6}{36}$. By ophthalmoscope, 2 D H each, with some astigmatism in L eye.

For a year has not been able to read well from the blackboard, and by lamplight cannot read at all. Disturbed sleep, visual hallucinations ; no special complaint of diplopia.

Visual field shows marked concentric contraction. With red glass diplopia, but the double images change their place and relation repeatedly during the course of the examination. No disturbance of motility of the eyes can be made out.

Aug. 5, 1896. With red glass, diplopia. When the eyes are directed straight ahead, vertical diplopia, the image of the left eye being straight over that of the right. When the eyes are directed up, the double images separate laterally (homonymous diplopia) until they are 25 *cm* apart. When the eyes are directed down, there is vertical diplopia with the image of the left eye straight below that of the right.

I will not adduce any more histories of this the ordinary form of hysterical disturbance of sight. But I should like to give a characteristic example of another form, marked by suddenly developing muscular contractions.

Böhndel, Clara, eighteen years of age, complains of pain in the eyes, lachrymation, and occasional impairment of sight for distance. When she reads or sews for a long time, objects become black before her eyes, she has muscæ volitantes, and there is a glare of light before her right eye. Occasional micropsia, so that she takes grown-up people for children. Diplopia at times. Constant right-sided headache. Marked vaso-motor neurosis. The trigeminus very sensitive at its points of emergence upon the face ; other points on the head very tender to pressure.

Visual acuity reduced. Varying spasm of accommodation.

If the eyes are made to follow the movements of a finger held 50 *cm* in front of them, sometimes the eye that is moved by the externus is suddenly arrested at the middle line, and does not go any farther outwards, while the other eye, that is moving inwards, follows the finger steadily. Thus the picture of a paretic squint due to complete paralysis of an externus is simulated. At other times, the eye that has to move outwards pursues its course in company with the other eye, but does so by jerks and not steadily. But in either case, the disturbance of motility is only present when the movement is an associated one ; *i. e.*, if either eye is covered and the other used for fixation, the latter follows the finger both inward and outward without showing any deflection.

If the eyes are made to fix an object placed 30 *cm* in front of them, both suddenly pass into a state of extreme convergence. Then, also, double images can be made out, although the diplopia is not marked, and generally requires a red glass for its recognition.

Unfortunately this case could not be kept under observation longer.

What conception are we to entertain of such a diplopia as that which I have described in these hysterical subjects?

Is it an objective or a subjective symptom? Does it depend upon changes in the centres governing the movements that are affected, or does it originate purely in the imagination? *Does the patient really see double, or does he only imagine that he sees double?* As is the case with the other symptoms of hysteria, the diplopia is a strikingly variable and changeable phenomenon, and without marked effect or influence. Are we to conclude from this that the diplopia exists only in the imagination? I do not believe so. It is quite certain that after a hysterical patient has once acquired double images, he has an obstinate way of holding on to them, and that often, under the influence of the will, pareses or contractures of the muscles are set up, which give rise to different kinds of diplopia. But for all this to occur, he must see double in the first place. In fact, he comes to us complaining that he sees double. And that he actually sees double is proved with absolute certainty by the fact that if we place a red glass before one of his eyes, he at once distinguishes a red and yellow light, and tells how they are placed. This no man who is unaware of the conditions of the test could do if his eyes were acting in a normal manner. *We may, therefore, say with certainty that objective diplopia is present.*

If now we inquire as to the *seat of origin of these disturbances*, we shall have to exclude at once both the peripheral nerves supplying the muscles, and also the nuclei. We do not find any typical isolated paralyses. Nor have I seen any case of ophthalmoplegia interna. It is true, there were cases now and then with unilateral mydriasis associated with slight disturbance of accommodation. But the pupils were never absolutely without reaction, and the disturbance of accommodation was no greater than it would be if due to physical disturbance or simulation.

In hysterical diplopia, in fact, the trouble consists in a *disturbance of the associated and conjugate movements of the eyes.* We have seen in our cases that, while in associated movements there develop disorders of motility and, consequently, diplopia, the movements of each eye by itself, when the other is covered, are performed without difficulty. *The seat of these disturbances we must refer to the cerebral-*

cortex, and to that region of the latter that represents the point of origin of the conscious and willed, *i. e.*, the associate and conjugate movements of the eyes.

The effect of such disturbance of the cerebral cortex upon the associated movements may be twofold, producing either pareses or contractures. Examples of each have been given in the cases described above.

I will briefly summarize the individual characters of physiological and hysterical diplopia.

I.—PHYSIOLOGICAL DIPLOPIA.

1. *In almost all men the presence of double images* in certain directions of the gaze can be demonstrated by suitable tests. Such diplopia *never occurs spontaneously* when the eyes are being used in the natural way.

2. Such diplopia never occurs when the gaze is directed straightforwards, but *only when the eyes are rotated*—and generally only when they are rotated very far—in the different directions.

3. The double images are almost always *homonymous*, and are so too for directions of the gaze both up and down.

4. *Physiological diplopia depends upon the fact* that in the associated lateral movements of the eyes the power of either eye for turning inward exceeds its power of turning outward. Such diplopia occurring in the course of movements up and down depends upon the difference shown by the two eyes in the ability to make excursions in these directions.

II.—HYSTERICAL DIPLOPIA.

1. Hysterical diplopia produces *spontaneous* double vision, which, however, occurs only at times and causes the patient very little trouble.

2. The double images may be *either crossed or homonymous.* In either case, they are present *when the gaze is directed straight forwards.*

3. The phenomena of the diplopia *do not agree with those of paralysis of an eye muscle* due either to a peripheral or a nuclear affection of the nerves.

4. *The relation of the double images is inconstant.* Sepa-

rate examinations, even though made close together, give varying results.

5. The diplopia is to be regarded as due to an *affection of the centre for voluntary associated movements*, *i. e.*, an affection of some region in the cerebral cortex.

ADDENDUM.

A CORRECTION TO DR. LIEBRECHT'S PAPER.

By Dr. GUILLERY, Cologne.

In the paper just given, Liebrecht describes a "physiological" diplopia which is observed "usually not until the excursion-movements have been carried nearly to the extreme limit of which the eye is capable," and in many cases only when "the patient's attention has been specially directed" to the double images. He further goes on to deny the existence of latent disturbances of the eye muscles, stating that the slightest actual paralysis makes itself evident through the spontaneous development of double images. That is, there is no such thing as a stronger innervation of one or another muscle in the interest of single vision, although the possibility of such innervation is proved by the fact that persons can overcome prisms.

I may leave to other scientists to determine how far they are willing to assent to these and other statements of Liebrecht's, and will simply say a word to defend myself from the imputation of having fallen into the same error that Liebrecht did. He asserts that I repeatedly made out the existence of diplopia in tabetic patients by using the same methods that he did, and he hence is constrained to assume that my statements upon positions of the eye which are associated with special muscular strain have given rise to this mistake. Hence I find it necessary to state that I did not make my examinations in the same way that Liebrecht did, but according to the principles commonly employed in the diagnosis of muscular disturbances. A paralysis obviously is most clearly made out in that direction of the gaze in which the affected muscle is, when normal, predominantly active; but I did not make the mistake of confounding the symptoms of paresis with those which are produced by simple tiring of the muscles and which evidently are what Liebrecht is talking about. If the examination is made with the eyes in these unusual positions, and if the patient's attention is kept " specially directed," the muscles very soon, of course, get tired, and, as the externus is weaker, it becomes tired first, so that homonymous diplopia is produced. My express statement that I had never found in normal persons the symptoms that I described, Liebrecht characterizes simply as a mistake, instead of drawing from it the proper inference, viz., that my method of examination differed essentially from his own.

A CASE OF CORNEAL CURVATURE THE OPPOSITE OF KERATO-CONUS. (CORRIGIBLE PERIPHERAL MYOPIA, AND CORRIGIBLE CENTRAL HYPEROPIA IN THE SAME EYE).

By Dr. AXENFELD, Marburg.

(*With six figures in the text.*)

Translated by Dr. J. A. Spalding, Portland, Me.

IT is not unusual in the recovery from ulcerations to find a facet of the cornea uniformly flattened, and showing the signs of circumscribed decrease in refraction of the eye. But this *transitory* condition, as well as all of those entirely different irregularities of refraction appearing after old leucomata of the cornea, are hardly to be considered from an optical point of view, and are consequently consigned to the large group of incorrigible irregular astigmatism. Therefore a certain curiosity attaches itself to those cases in which a *permanent* transparent flattening of the cornea was caused by central ulcerations, so that by covering the pupil they produced a partly corrigible hyperopia, and at first made it difficult for the patient in using the eyes to accommodate exclusively according to the central refraction.

In the first case which I reported[1] I failed to call attention to a similar one by Weiss[2] and I will first give a brief account of that instance.

A girl of nineteen, always weak-sighted, but more so for the past four years, complained of monocular polyopia of O D, which disappeared on using + 6. D, whilst at the same time V was increased from $\frac{15}{200}$ to $\frac{15}{40}$. Weaker convex glasses improved V, but did not remove the polyopia. The ophthalmoscope showed a grayish reflex in the cornea (due not so much to opacification, as to a new curvature), which varied with the degree and manner of illumination. Measurements showed the periphery more curved than the centre. As the eye turned sideways the image decreased in size. The left eye showed similar but more irregular alterations.

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[1] *K. M. f. A.*, Feb., 1893.

[2] *Graefe's Archiv*, Band xxi., part 2, p. 187.

The refraction by the ophthalmoscope in the centre of the cornea was + 8 D; toward the periphery less and less, whilst the lateral halves of the optic papilla apparently increased in size, a picture which Weiss attributed to a second and overlying image. In the same way that the patient saw double, so he too saw double. Weiss explains the polyopia in this patient by the peculiar corneal curvature. The patient preferring a weakly hyperopic, or the most highly hyperopic portion of her refraction, figures of dispersion arose in the atropinized, uncorrected eye, and partly covered one another, so that the brighter illumination of various points produced the polyopia. The condition of affairs in the eyes was, in Weiss's opinion, opposite to the so-called kerato-conus.

Although the irregular curvature probably excited the polyopia, yet as the decreased curvature of the cornea was uniform, nothing but a bright circle would arise about the centre of the retina exactly opposite to what the observer saw on looking in. And even if in such an event a central highly hyperopic spot is in this way, so to speak, diminished, that the patient psychically suppressed the sensation permitted by the other portions of the cornea, the only result would be a ring around the centre, as long at least as the highly hyperopic portion was so exactly centred as in Weiss's case. Nor would the dissimilar illumination be affected by convex lenses. We must therefore conclude, either that the circles of diffusion were due to psychical changes, or to alterations in the lens. Nor can I imagine how a gradual flattening of the cornea could produce actual reduplication of the images.

The manner in which self-introspection, even in persons free from hysteria, contributes to the production of monocular diplopia, was lately emphasized to us in the person of a patient who, owing to blindness of his former good eye, was suddenly thrown back on his only remaining eye, which was highly astigmatic (+ 3 D) and cataractous. He asserted that everything seemed double, until he got appropriate cylinders, when single vision was once more enjoyed.

My cases differed from that seen by Weiss in being plainly due to corneal ulceration and in being faceted, and in not representing a *uniform gradual* increase in the radius of curvature from the periphery to the centre, but in a slightly conical curvature to which that of the periphery closely attached itself. But since the original publication, owing to fresh ulceration, the formerly hyperopic spots have become of no use optically.

Having just seen still another case of this sort I beg leave to report it briefly.

Henrietta S., æt. fourteen, had inflamed eyes as a child, but since then her vision has remained the same, except that she suffered three years ago from a catarrhal conjunctivitis which temporarily affected the sight of each eye. There is no apparently visible change in the refractive media of the eyes, and the patient has been regularly at school; she can sew and work like other children, and has never complained of a blur before the eyes.

Both of the eyes show slight conjunctival scars, but nothing else abnormal.

The left eye has some old opacities of the cornea and the ophthalmoscope shows irregular astigmatism.

The right eye exhibits under focal illumination in the centre of the cornea a small punctiform transparent spot as large as the head of a pin, but otherwise than that the cornea is everywhere normal. The ophthalmoscopic mirror, at about 40 *cm* distance, reveals a picture, more or less clearly delineated in Fig. 1.

The ophthalmoscopic determination of the refraction in the erect image shows hyperopia + 5 D, but as we make the observation we see how the refraction alters the moment that we move to one side, whilst with artificial mydriasis it is plain that the hyperopia is limited exclusively to a perfectly circular clear central district of about 5 *mm.* in diameter, whilst the periphery, generally, without any lens or at least without convex lenses, does not give a clear erect image at all. The bright hyperopic centre is set off against the periphery with its entirely different refraction by a transparent grayish ring, which is very distinct with the plane mirror, weaker by lateral illumination, and depends a great deal on the position of the mirror, the brilliancy of the flame, and so on. If the hyperopic portion is illuminated perpendicularly to its centre the ring is not well defined, only the centre is less bright than the periphery and set off against it. On the contrary by gently rotating the mirror the margins become darker, and if we use a very weak light at a great distance nearly three-quarters seems contoured. This, therefore, is a purely skiascopic and not a constant optical phenomenon.

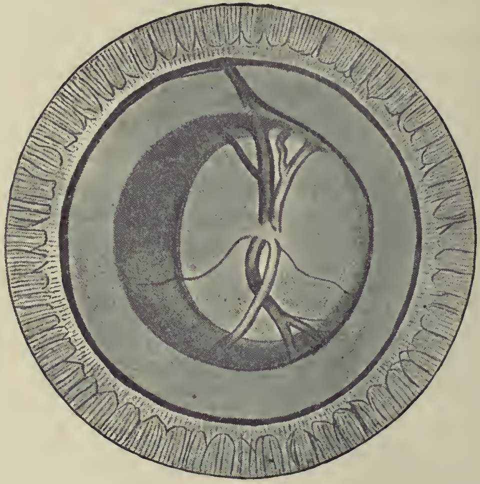

Fig. 1.

Hence whilst from a greater distance on using the mirror to illuminate the eye we see in the centre the erect image corresponding to hyperopia, the *peripheral* portion outside the gray ring is free from similar details. All that we can see there are very fine vessels *moving in the opposite direction*, and seeming to surround the central hyperopic district circularly. The enlargement of any vessel in the periphery is less than in the central portion. If we grasp the image of any vessel so as to see it running over from the peripheral portion to the central, then there is a change in its size and movements according to which zone we for the time being use.

Ophthalmoscopic determination of the refraction of the peripheral portion is difficult, but skiascopy shows a myopia of − 8 D.

Therefore, with a moderately dilated pupil, without mydriasis, there is a central hyperopia of + 5 D and a peripheral myopia of − 8 D, whilst the cause of this great difference of refraction lies for the most part in the cornea.

In comparison with the *left* cornea, the right shows on profile view *flatter in the centre*, and the anterior chamber is shallower.

The rings of Hirschberg's keratoscope in the right eye are broader in the centre than in the periphery. If the figure falls on the intermediate zone between the hyperopic and myopic portions, the appearances are exactly opposite to those of kerato-conus, the inner portions being broader, the peripheral narrower.

Examinations with the keratoscope as well as with the ophthalmometer show that the transition from the flat centre to the more curved periphery is not as it seems to the naked eye a *gradual* one, but that in the marginal portion of the centre, in contrast with the periphery, the radii of curvature rapidly change.

Testing the vision without mydriasis shows O D, V $\frac{6}{9}$; all glasses diminish the vision. O S, about the same amounts. Starting with the idea that with the back to the light during the tests for vision, some portion of the cornea was employed that lay outside the strongly hyperopic portion, the cornea was illuminated with a lens as in lateral illumination, so that the pupil was a good deal contracted; but even then convex glasses were not accepted. There was, therefore, a latent hyperopia, discoverable only by the use of the mirror.

Under atropine mydriasis, the ophthalmoscope shows O D centre H + 5 D, peripherally by skiascopy M − 7 D.

Vision, without glasses, no letters at 6 M, with + 5 D $\frac{6}{18}$ to $\frac{6}{12}$. Weak convexes make the vision worse; but *concave* − 7 gives $\frac{6}{18}$.

The patient reads without lenses, Schw. 3 at 13 *cm*, and later with + 12 the same letters at the same distance. With the strong convex lenses she says that reading is easier and the letters look larger.

The patient is consequently, for both far and near, as well hyperopic as myopic in the same eye, and both states of refraction can be corrected.

Repeated tests and many observations during four days, whilst the atropine-mydriasis was maintained, all showed substantially the same results.

This case, in which hyperopia and myopia existed in one and the same eye, is an excellent example of an eye with multiple foci, corresponding to a lens of double focus (Fig 2).

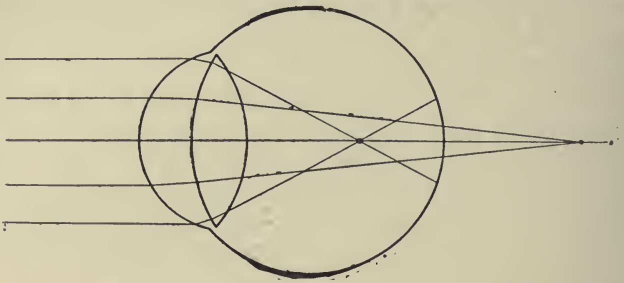

FIG. 2.

Having this title, it belongs to the same class as kerato-conus and lenti-conus, for which L. Müller proposes the name of "Lens with double focus."[1] Under this title there have also been included cases in which the centre was hyperopic and the periphery myopic; but more often, as in kerato-conus, the centre refracts the more. Hence there has been described more often in this condition of affairs a different skiascopic shadow-play, peripherally and centrally, and the simultaneous appearance of erect and inverted details; but never any such possible correction of the different refracting portions of the cornea. But Weiss's case, and cases of kerato-conus, resemble mine in so far as that other glasses than the best correcting ones improve the sight a little. It is hardly worth mentioning that the condition of regular astigmatism in which people see a trifle better with weak convex or concave lenses has no connection with this present case.

The patient has a wonderful capacity of exercising at will either the myopic periphery or the hyperopic centre of the eye, or even the intermediate zone approaching emmetropia, without being in the least disconcerted by the images of the other portions. She also has without a lens a vision of $\frac{6}{18}$, which is only possible with the emmetropic or slightly hyperopic portions.

If we wish to represent *mathematically* a gradual flattening of the cornea, it most resembles a flat rotation-ellipsoid in which the rotation has taken place about the short axis. Weiss's case is the only pure example so far described. Yet it is remarkable that the difference in refraction is so small in comparison with the marked and rapid difference in the values of the radii of curvature, that we must assume that a partial compensation has occurred owing to other optical conditions.

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[1] *K. M. f. A.*, June, 1894.

My case also showed a moderately uniform increase of curvature toward the periphery, but the transition from hyperopia to myopia is somewhat more rapid. Moreover, the peripheral myopia, in contrast with the central hyperopia, corresponds very well with the conditions which we must imagine in the case of a flat rotation-ellipsoid nearly bisected. So that this case stands between that of Weiss and others before described by me, which may have been confounded with the flat rotation-ellipsoid. But, mathematically, the corneal curvature in both of our cases is not opposed to kerato-conus, but only to the physiological ellipticity of the cornea. Also in kerato-conus, with its hyperbolic curvature, the sharply curved centre flattens more rapidly toward the periphery, and, therefore, cases of faceted flattening are more in correspondence with this condition of things.

In now accepting the term, "opposed to kerato-conus," I simply mean that such cases of central flattening are opposed to it in the chief symptom, namely, that the centre refracts less than the periphery. And in this sense the name is a proper collective name, because it touches the essence of the functional anomaly, and embraces the alterations in question amongst "eyes with a double focus." We may also be here reminded that a flat rotation-ellipsoid offers better chances for correction by spherical lenses than another rotation-ellipsoid with longer axis of revolution.

It is interesting at this point to compare the relations at the poles of one and the same ellipse. Thus, Fig. 3 represents an ellipsoid rotated about its short axis B B′. At B the radius of curvature is $\rho b = 9$ *mm.* If I now imagine to be excised about the pole a symmetrical segment of the surface of 10 *mm* linear diameter, then the radius of curvature in C and C′ will be 7 *mm.*

Then we have by reckoning the semi-axes of the ellipsoidal section :

$$O A = a = 7.35 \ mm,$$
$$O B = b = 6.0 \ mm.$$

The points C and C′ have a distance—

$$\text{from } O B = 5.0 \ mm,$$
$$\text{from } O A = 4.4 \ mm.$$

Therefore the curvature increases from B = 0.1111 to C, where it amounts to 0.1469.

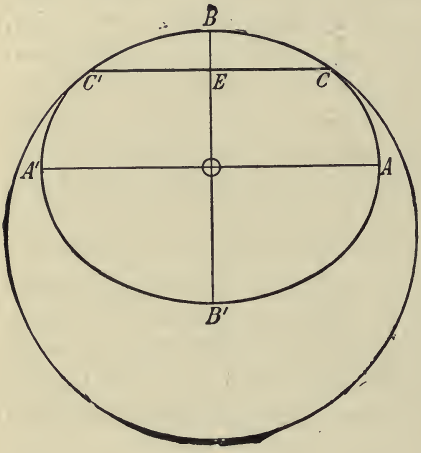

FIG. 3.

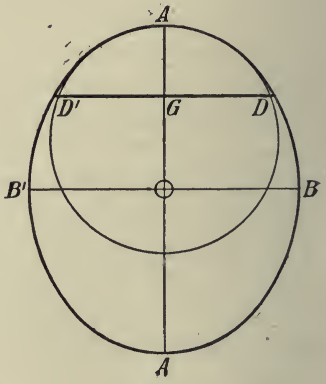

FIG. 4.

NOTE.—The points C and C′ in the figures are erroneously in contact with the circle, whilst in reality, and as shown in the original drawing, they are uniformly at some distance from the same. So, too, in Fig. 4, the distance between D and D′ is too small.

If I now assume that from an ellipsoid of the same axes, but rotated on the *long* axis, we remove a cornea, or, in other words, a piece 10 *mm* in diameter, that is to say, D to D′, we have :

Fig. 4.—The radius of curvature at A = ρa = 4.9 ; at D (where G D = D′ G = 5.0, G = 4.06), ρa = 7.66 ; *i.e.*, the curvature $\frac{1}{\rho}$ decreases from the point A $\left(\frac{1}{\rho a}\right)$ to the point D $\left(\frac{1}{\rho a}\right) = 0.1304$

Hence in the first case the curvature increases about 0.0358 and in the second 0.0737, that is, twice as much.

In regard to the *diagnosis*, I would emphasize the utility of the plane mirror and of skiascopy, as long since recommended for all forms of irregular astigmatism by Knapp, at the Heidelberg Congress, in 1864. If the flattening is gradual the centre will appear slightly darker, owing to the reduced concentration of the passing rays. In faceted rupture of continuity this does not occur within the flattened surface. On the contrary, with skiascopy, or decentred position of the mirror, a gray ring appears on the margin, as well as in gradual flattening in those portions where the hyperopia passes over into myopia.

The appearances in kerato-conus are generally opposite to these, the bright sectors appearing with their bases outward, according to the position of the mirror. In other cases the strongly myopic centre is distinguished from the neighborhood by a very dark grayish ring. The latter is almost always constant, but is variously strengthened or diminished in tint, and corresponds in its origin to the dark margin of the lens when illuminated. Knapp also recommends us to watch how the light falls on the iris through spots that are abnormally curved. In case of bulging we see a small focus with darker contour; with flattening, a small, darker spot with a brighter contour, because the flat portions concentrate the light less strongly. But this iris-phenomenon is only valuable in small circumscribed variations in the curvature.

Instead of using the common keratoscopic ring-shaped discs for examining these forms of corneal irregularity, as well as in cases of irregular astigmatism, I have had constructed of *papier maché* a concave hollow cylinder, upon the surface of which I have had painted long, uniform, black and white stripes. Owing to the concavity of this hollow cylinder all of the various portions of the longitudinal stripes are approximately at equal distances from the surface of the cornea, whilst plane discs at the usual distances of examination give disproportionally larger reflected images for the centre than for the periphery. With such a curved apparatus as this we can cast a striped figure across the whole cornea, and in the case which I have here reported it was interesting to see how, toward the centre, the stripes bulged as in Figure 5, whilst in the cases of keratoconus they contracted towards the centre, as shown in Figure 6.

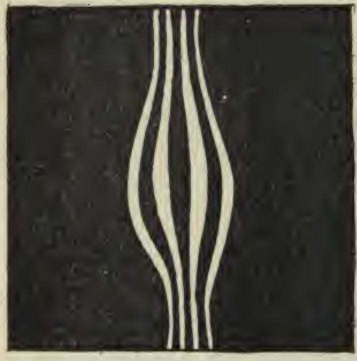

FIG. 5.

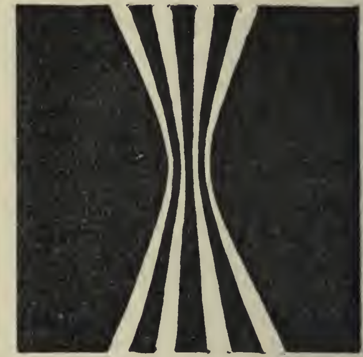

FIG. 6.

The *ætiology* of the undoubted flattening of the cornea is difficult to explain in our case. It is most probable that inflammation in youth was at fault, but that the flattened portion remained always slightly opaque, whilst the little spot in the centre cleared up to almost perfect transparence, as can only be expected in youthful patients, owing to the capacity for regeneration so active in the early years of life.

I would here mention that similar cases might easily be regarded as ones of simple hyperopia, and so their peculiarity be overlooked, as actually happened in my case, which was not precisely determined until after the most careful and prolonged examination with and without mydriasis.

The *extraordinary transparence* of the hyperopic corneal district was of importance in this case. In the experiments that were made at the time, it was easy, through a small concave lens (3.5 *mm* in diameter), even when it did not actually cover the pupil, to accommodate sharply, and then again through the unarmed emmetropic periphery, so long as the glass remained transparent. It only became difficult when by artificial opacity the vision through the little lens became greatly reduced; then, accommodation through the lens alone became very difficult.

Finally, we may urge that this rare and indeed characteristic picture of disease of corneal curvature opposed to kerato-conus ought to be removed from the group of irregular astigmatism and studied in and by itself.

A CASE OF TRAUMATIC PULSATING EXOPHTHALMUS WITH AUTOPSY.

BY DR. O. STUELP, STRASBURG.

Translated by Dr. J. A. SPALDING, Portland, Me.

(*With Text-Plate VIII.*)

ALTHOUGH the morbid picture of the so-called pulsating exophthalmus has long been well known and carefully described by Sattler,[1] I have no hesitation in offering the appended case for publication, because it is of such extraordinary interest from many points of view.

On the 18th of August, 1894, Johann D., æt. forty, was brought to the eye clinic with the statement that he had been treated for some time at the General Hospital, but seemed to stand in need of special treatment, or even an operation, for some injury to the left eye. We were unable to discover the cause of the injury, because at the time of his reception the patient was in a somnolent and apparently a very serious condition. But ordinary inspection showed facial paralysis on the right side, and excessively œdematous swelling of the entire region of the left eye, together with well marked protrusion of the ball. The skin of the eyelids was hot and very red and traversed with numerous hard and swollen veins. The conjunctiva was much swollen, injected, and chemotic so that the entire upper fold beneath the upper lid which was in a state of complete ptosis projected forward as a thick, red, and tumefied wall of tissue. The lower lid was totally everted and on its inner third was an ulcer very hard to the touch and covered with crusts. The globe was quite immovable in any direction, the cornea hazy, the pupil enlarged and irresponsive, whilst the refracting media being very clear, revealed with the aid of the ophthalmoscope the picture of well marked congestion of the disc with tortuous veins and numerous hemorrhages in the retina. Vision, Fingers at 2 *m.* Any pressure on the globe or its immediate neighborhood produced excruciating pain.

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[1] *Graefe-Saemisch*, vi., p. 245.

At a consultation of the staff, although some were of the opinion that there might be orbital cellulitis, the majority were of the opinion that the case was one of traumatic pulsating exophthalmus.

The history of the patient, as taken at the entrance into the General Hospital, was, that about four weeks before, he had fallen down stairs and in falling had struck the occiput with great force. He suffered from immediate hemorrhage from the nose and ears, then became unconscious, and after a few days of apparent improvement the left eye began to protrude from the orbit, accompanied with violent pain in that cavity and the entire left side of the head, which, later, increased, if possible, in excruciating intensity. At the same time the patient complained in the left side of the head of a constant rushing and roaring sound which, at times, was interrupted with hissing and throbbing noises like those of a locomotive when steam is escaping.

A very careful examination failed to show anywhere about the region of the eye, except over a very minute zone between the globe and the nasal portion of the supra-orbital margin any traces of pulsating movements. But, at the spot designated, there was visible to the eye a slight rhythmical elevation and depression. So too, the finger tip, if pressed deeply into the orbit could distinctly perceive a pulsation, synchronous with the radial pulse, but ceasing promptly or reviving accurately on compression or relaxation of the left common carotid artery.

The stethoscope brought out on the entire left side of the skull a uniform roaring, murmuring sound like that of a distant waterfall, with occasional mixture of higher scratching or even whistling noises, and against the pulsating spot in the orbit we could perceive at intervals a systolic murmur. But all of these sounds ceased, or recurred, on compression or relaxation of the left common carotid as the pulsations had done before.

All of these symptoms led us to make the diagnosis of pulsating exophthalmus, probably due to rupture of the internal carotid in the cavernous sinus as a result of the traumatic fracture of the base of the skull.

Additionally, the patient showed diminution of the sensibility of the left half of the forehead, and increasing somnolence. There was nothing abnormal in either auditory canal.

The patient being sufficiently awakened to understand his condition, consented to an operation, which we decided should be a ligation of the left common carotid. But as his condition soon grew worse the operation was postponed, and simple compression of the artery was tried instead. This, however, only increased the pain and the protrusion of the eyeball and was soon omitted. Two days later the patient died gradually, with symptoms of rapid pulse and respiration and gradually rising temperature.

The autopsy made 18 hours after death showed the following condition of affairs :

Fracture of the base of the skull, large traumatic softening in the left hemisphere, rupture of the internal carotid in the cavernous sinus.

There is well marked œdema around the left eye, and yellowish discoloration of the skin. The longitudinal sinus has only fluid blood. The pia is everywhere remarkably dry, the gyri thin and flattened, the vessels moderately injected, the carotids thin-walled, without a trace of thickening.

The lower surfaces of the temporal and frontal lobes are very grayish-red in comparison with those of the right side, and the pial vessels are injected and tortuous. The corpus callosum is soft, the left lateral ventricle dilated, and the left corpus striatum red and softened in comparison with the right. Beneath the softened cavity is a second large cavity filled with fresh blood-clots, and occupying the entire frontal lobe, so that of normal cerebral substance there is hardly a thickness of more than 5 *mm.*

The posterior portion of the ganglia on the left side is yellow, softened, and hollow to the depth of 2 *cm.* On opening this cavity it communicates with other passages leading to the centrum semiovale.

The entire softening-cavity in the left hemisphere seems to have no communication, however, with the lateral ventricle.

This entire region on the right side is normal.

The pons has a small hemorrhage, and is flattened.

The right middle cranial fossa contains, just beneath the dura, a membrane originating from a former hemorrhage, and in front of the same in the right middle cranial fossa is a very narrow but distinct fissure extending to the anastomosis between the squamous portion of the temporal bone and the sphenoid, and then stretching along into the parietal bone where it terminates in its centre in a T-shaped crack.

Careful preparation of the region about the left cavernous sinus shows that the posterior portion is occupied with a blood clot, attached firmly to its walls and of a grayish color and firm consistency. In front, this thrombus extends to the posterior wall of the carotid, whilst that portion in front of the carotid contains only fluid blood. This part of the sinus is much dilated, as are also the ophthalmic veins.

The wall of the carotid which is not turned toward this portion of the sinus contains a large opening with smooth margins, and extending through all of the arterial coats so that there is an open communication between the cavity of the carotid and the anterior portion of the sinus. But this artery, otherwise, is perfectly healthy and free from blood.

The ocular muscles on the left side exhibit well-marked hemorrhagic infiltration.

The rest of the body offers nothing of interest.

Sattler's list of cases of pulsating exophthalmus numbers one hundred and six, fifty-seven of which were of traumatic origin. And since 1880 I find twenty-three additional cases of the same nature, so that we now have a list of ninety cases of traumatic origin so far published.[1]

Amongst these eighty cases in which a diagnosis was made of rupture of the internal carotid in the sinus cavernosus as the result of an injury, there were autopsies in six.[2]

Only four of these cases showed at the autopsy a rupture of the aneurismal carotid into the sinus cavernosus, whilst in Blessig's case a rupture could not be positively ascertained, and in Bauman's patient, in whom (after the blow of a fist against the temple) all the symptoms of an orbital aneurism became developed, there was discovered, instead of the expected ruptured carotid-aneurism, nothing but a thrombosis of the cavernous, circular, transverse, and petrosal sinuses, and of the left ophthalmic vein.

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[1] A bibliography of cases up to the year 1887 can be found in a paper by Nieden in *Archiv f. Augenhlkde*, xvii., p. 275, and later cases have been reported by Rossander, *Nagel's Jahresbericht*, 1888, p. 526 ; Poirier, *Arch. Gén. de Méd.*, 1890, p. 513 ; LeFort, *Rev. de Chirurgie*, 1890, p. 368 ; Kalt, *Semaine Méd.*, 1891, p. 336 ; Mueller, *Inaug. Dissert.*, Halle, 1891 ; Pulvermacher, *C. f. A.*, 1892, p. 329 ; Reeve, *Transac. American Ophthal. Soc.*, 1893.

[2] All of these can be found in *Graefe-Saemisch*, Band vi., p. 847 *et seq.*

Our case then would be the fifth in which a rupture of the internal carotid, due to traumatism, could be distinctly shown by autopsy to be the cause of a pulsating exophthalmus.

The symptoms observed during the patient's life could be explained in this way: The muscular paralysis of the left eye and the anæsthesia of the left half of the forehead were probably due to compression of the nerves for the ocular muscles, as well as of the superior branch of the trigeminus in the sinus cavernosus. The right facial paralysis could be regarded, possibly, as the consequence of some alteration of the nerve foramen at the base of the skull by the direct fracture. I should, however, prefer to make the hemorrhages in the pons and rhomboidal sinus responsible for the paralysis, since, on the one hand, the line of fracture was rather distant from the exit of the facial nerve, whilst, on the other, the escape of the auditory nerve from injury favors a basal cause.

There is no doubt that the tremor and convulsions in the right arm, as well as the absence of the right-sided belly and cremaster reflex, were due to the focus of softening in the left hemisphere. On the contrary, it is very remarkable that the colossal destruction of the brain substance, which had even encroached upon a portion of the fibres of the corona radiata, failed to produce paralytic symptoms in the extremities, and, on the whole, had produced so few symptoms that the result of the autopsy was totally surprising, since so extensive lesions have never before been discovered at any of the autopsies published.

The ancient large focus of softening is most probably the direct consequence of the rupture of the internal carotid occurring directly after the fracture of the skull, and persisting without noteworthy symptoms until secondary hemorrhage produced death.

After all these considerations we must make some limitations, hereafter, so far as the prognosis is concerned, in these and similar cases. For although, according to Sattler, the prognosis, so far as life is concerned, is not so very unfavorable (for I find but nine fatal cases amongst the eighty before referred to, that is to say, but eleven per cent.), yet our case demands careful consideration in diagnosis, and increases the number of those cases in which the patient, after apparently withstanding the results of a fracture of the base of the skull, and being only affected with the symptoms of rupture of the carotid, suddenly succumbs to a secondary hemorrhage.

Finally, our case gives us opportunity to make some remarks on the indications for ligation of the common carotid.

Generally speaking, this method of treatment even in traumatic pulsating exophthalmus has been frequently employed and has had many successful exemplifications of its great value.

There have been so far fifty-four cases recorded, amongst the eighty total which I have been able to collect, and of these, thirty were successful, (in a few instances only after ligation of both common carotids,) fifty-five per cent.; fifteen were of doubtful value, twenty-seven per cent.; and nine (eighteen per cent.) were failures.

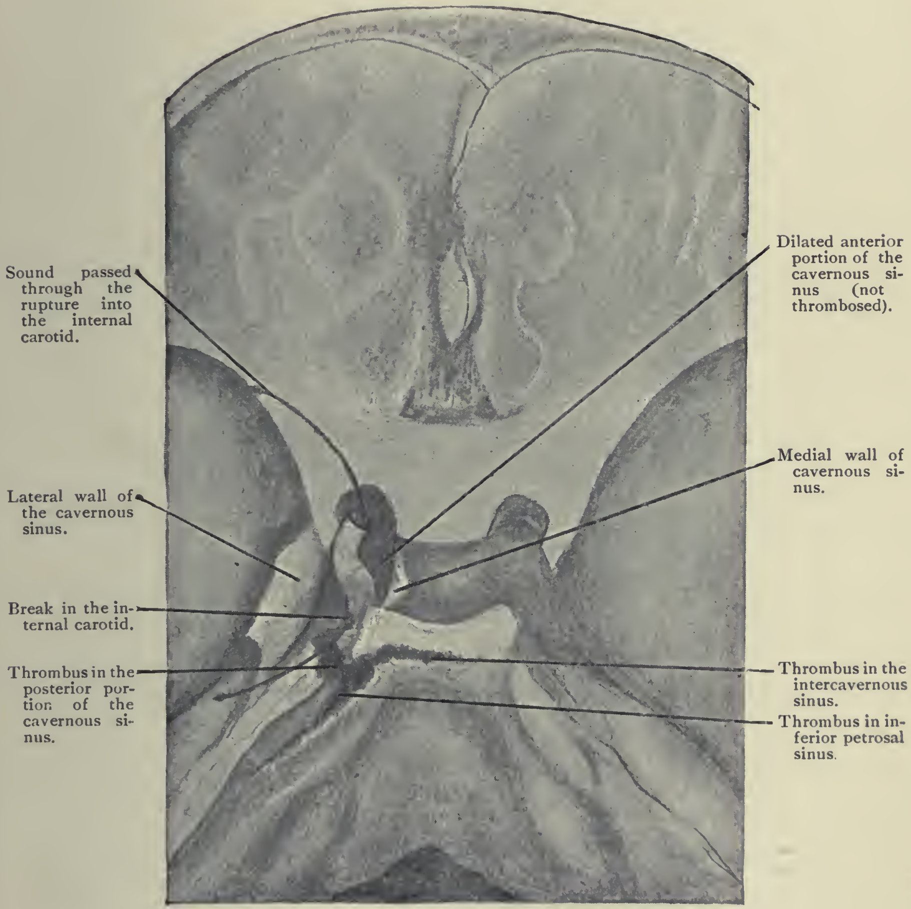
The remaining twenty-six cases were treated without the radical operation, partly with internal medication, partly with digital compression, ergotine injections, electro-puncture, etc., and of these, ten were successful, thirty-eight per cent.; nine doubtful, thirty-five per cent.; and seven remained entirely unchanged, twenty-seven per cent.

Of the latter twenty-six, two declined any treatment whatsoever, and of these one underwent a spontaneous cure and one a rapid and painful death.

Of course a list of eighty cases in all, is too small on which to base a correct and final opinion in regard to the value of various methods of treatment in traumatic pulsating exophthalmus. This much, however, we can see, that despite the fact that the failure to operate at all exhibits by comparison with the operation by no means poor results, yet ligation of the carotid offers proportionally the greatest benefit. But our case teaches us that, before this operation is suggested, we should make a most searching examination for any possible grosser cerebral lesion, and if there is the least suspicion that such exists, the patient should be warned against the operation.

If our patient had appeared at an early date, and before any observation of the symptoms of somnolence, right facial paralysis, and so on, all of which suggested a focus of softening, (tremor, cramps in the right arm, and the absence of belly and cremaster reflex), he would probably have been subjected to the serious operation of ligation of the left common carotid, with the result that in all human probability he would have died on the operating table whilst under the influence of the anæsthetic, or if he had survived the narcosis and the operation he would, owing to the ligation of the artery, pretty surely have succumbed to the sudden disturbances of nutrition which the large focus and cavity of softening would have unfavorably influenced.

Dr. Stuelp's Paper.


Sound passed through the rupture into the internal carotid.
Dilated anterior portion of the cavernous sinus (not thrombosed).
Medial wall of cavernous sinus.
Lateral wall of the cavernous sinus.
Break in the internal carotid.
Thrombus in the posterior portion of the cavernous sinus.
Thrombus in the intercavernous sinus.
Thrombus in inferior petrosal sinus.

ABSTRACTS OF THE PAPERS IN VOLUME XXX. OF THE GERMAN EDITION NOT PREVIOUSLY TRANSLATED.

(*Concluded.*)

By Dr. WARD A. HOLDEN.

XV.—BLINDNESS FOLLOWING ATTEMPTS AT SUICIDE BY SHOOTING.

By Dr. E. GOTTBERG.

In the *Berliner klinische Wochenschrift* No. 38, 1891, Hirschberg published a paper entitled "The Eye and the Revolver." From his statistics it appeared that only half of those who shoot themselves in the temple die, but one third of the survivors become blind in one eye or both.

Prof. WEISS has seen three cases of this injury, followed by total blindness in both eyes. The histories are as follows.

CASE 1.—G. S., twenty-four, shot himself with a revolver in the left temple September 22, 1882. The wound of entry lay 5 *cm* outward from the left outer commissure, on a level with the upper orbital margin. The ball went through both orbits and passed out through the right upper lid, destroying the right eye almost entirely. The left eye was completely blind, with exophthalmus, narrow anterior chamber, iridoplegia, and but slight mobility of the globe. The vitreous was clear, but the fundus was occupied in its central portion by a large hemorrhage. In the periphery of the fundus the normal reflex was seen, and the vessels were well filled. A year later the site of the hemorrhage was represented by a large white patch.

This patch corresponded to that seen in one of Cohn's cases: " The disc could not be found. The posterior pole of the eye was occupied by a glistening grayish-white patch 8 P D in diameter; no vessels were seen." Waldeyer examined Cohn's case microscopically and reported chronic chorio-retinitis with the formation of a plastic exudation on the inner surface of the retina, and simultaneous fibrous degeneration of the retina and atrophy of the choroid.

Case 2.—J. E., twenty-eight, shot himself in the right temple, April 12, 1896. The wound of entry lay 3.5 *cm* outward from the outer margin of the right orbit, and somewhat higher.

The right upper lid drooped. The ball was prominent. The pupils were wide and did not respond to the light. The patient was completely blind, but the fundi were normal. When examined later the mobility of the eye was found to be much diminished and the discs were pale.

Case 3.—K. S., forty-two, shot himself in the right temple August 3, 1894. The ball passed through the right orbit and the left eyeball, destroying the latter. Right: marked exophthalmus, sub-conjunctival hemorrhage, dilated and irresponsive pupil, lateral mobility of ball much reduced. Complete blindness. Many hemorrhages in the fundus, one overlapping the disc. Later history unknown.

In this case it must be supposed that the right optic nerve was severed by the shot. Whether suturing would be of any service in such cases is uncertain. The operation has not been done on man, although Professor Weiss has convinced himself, by experiments on animals, of its feasibility.

In connection with these three cases of bilateral blindness I would report one of unilateral blindness, with the kind permission of Prof. Nagel.

E. M., a student aged twenty-two, shot himself in the right temple in 1874. He was examined some time after the injury. The wound of entry was some 2 *cm* outward from the outer commissure and slightly higher. The right eye at once lost its sight, and there were dilatation and immobility of the pupil, and ptosis of the upper lid. Hearing remained poor in the right ear. The left eye preserved its sight. Later the mobility of the right eye was diminished, the disc was pale, and there were remains of hemorrhages in the retina.

From these reports it appears that the lesion of the eye from shot wounds may be of various sorts. The severity depends upon the point of injury. When the eyeball is grazed, the consequences are less severe than after injury of the nerve, hemorrhages taking place in the vitreous and coats of the eye, and in some cases the coats themselves being torn. Injuries of the nerve, whether the latter is completely divided or not, always end in atrophy.

The optic nerve may be struck in or behind the orbit, or it may be injured indirectly by detached splinters of bone. In many cases there may be a fracture of the base, which extends into the optic canal and causes hemorrhage into the intervaginal space. Encephalitis or meningitis in consequence of the fracture causes papillitis and atrophy of the nerves. The optic nerve itself need not be injured to cause blindness after shooting in the temple. Blindness after fracture of the base is unilateral or is associated with hemianopsia of the other eye. Michel believes that in these cases the cause is rather a callus-formation in the optic canal, than a hemorrhage into the sheaths. The callus would exercise a steady pressure upon the nerve; the amount of blood, however, would not be sufficient to completely interrupt conduction.

The paper concludes with abstracts of 16 similar cases from the literature.

XVIII.—EXPERIMENTAL INVESTIGATIONS ON THE INFECTION OF PENETRATING WOUNDS FROM THE INFECTED CONJUNCTIVAL SAC, ETC.

By Dr. LUDWIG BACH, Würzburg.

While in surgery the antiseptic treatment of wounds has given place generally to the aseptic, the change has been slower in the domain of ophthalmology. Not only are the familiar antiseptics recommended again from time to time, but it is thought necessary to introduce new ones. In recent years a number of investigations have been made which show what effect antisepsis has on the bacterial contents of the conjunctival sac and what effect asepsis has; the advantages being in favor of the latter. In former investigations I have found that a mechanical cleansing of the conjunctiva and lid margin and simultaneous irrigation with an indifferent liquid have far more effect in diminishing the number of germs present than irrigation with the best antiseptics. I may add that I have not obtained a greater percentage of sterile conjunctivas by using bichloride 1:5000 than by using an indifferent salt solution, the mechanical washing away of the germ being the main thing.

In preparing an eye for cataract extraction I cleanse the lid margin and conjunctiva and then have the patient wink a number of times for the purpose of forcing the germs toward the nose. After the speculum is introduced, I wash out the conjunctival sac again and cleanse particularly, by means of a sterile pledget with simultaneous irrigation, the place where the section is to be made. Every instrument and sponge that is to touch the eye is previously sterilized. In hundreds of eye operations, among them 200 linear extractions, suppuration has not occurred in a single case, though no antiseptics have been used.

I undertook to find out the degree of danger of infection to penetrating wounds made with a sterile knife when the conjunctival sac contains innumerable pyogenic germs. In fifty rabbits whose conjunctival sacs were inoculated with cultures of staphylococcus, a penetrating wound 6–8 *mm* long was made in the limbus with a sterilized curved lance. Of 25 cases in which the inoculation was made before the operation, infection took place in 5, the eye being lost from panophthalmitis in 3, and the suppuration ceasing in 2.

Of 25 cases inoculated after the operation infection took place in 2, one eye being lost from panophthalmitis and the other recovering.

In 10 further experiments, an infected lance being used to make the section, the eye was lost from panophthalmitis in 9, infection not taking place in 1. Those latter results were quite in accord with the results obtained by Knapp in similar experiments.

To prevent the infection of wounds the chief care should be the sterilizing of the instruments. If a wound is made at a point free from germs, with a sterile knife, there is but little danger of later infection from the sac.

XIX.—SUBCONJUNCTIVAL INJECTIONS OF BICHLORIDE. A REPLY TO DR. MELLINGER AND DR. GUTMANN.

BY DR. A. DARIER, PARIS.

Mellinger has at times observed extensive necrosis of the conjunctiva after subconjunctival injections of bichloride. Hence he concludes that the bichloride uniformly causes a severe irritation, leading to fibrinous adhesions between conjunctiva and sclera. Similar reports are heard from various sources, and I have seen such cases myself. They occur when the injections are made too near the limbus, or too deep under the conjunctiva, where Tenon's capsule has its attachment to the sclera. I have, therefore, recommended that the injections be made as far as possible from the cornea, and, as far as possible, tangential to the ball, in order to avoid Tenon's capsule and the episcleral tissue. The severe pain which unfortunately too often follows the injection can only be explained hypothetically, but it appears to me most probable that in such cases a nerve fibre has been touched by the needle. It may happen in the same person that one injection is painless, and the next, the same liquid being used, causes severe pain, lasting all day. The pain does not depend upon the nature of the liquid, for I have observed it after the injection of distilled water. Thus one patient, who had borne a number of bichloride injections well, found injection of distilled water much more painful.

It is true, however, that bichloride 1:1000 is more irritating than bichloride 1:5000; but the pain from the former solution is bearable, and may be lessened by adding cocaine 1 %, though when cocaine is employed, a mercurial such as the cyanide should be used, which does not precipitate cocaine. The solution must be prepared with sterilized, distilled water without the addition of alcohol.

The fibrinous adhesions between conjunctiva and sclera, mentioned by Mellinger, probably arise under the same conditions as does the necrosis of the conjunctiva which he speaks of. There is now under my care a young man who has received 125 injections of bichloride, yet his conjunctiva is normal and readily absorbs the liquid. The technique of subconjunctival injections has been described at length in my paper in the *Annal. d'Oculistique*, December, 1894.

Mellinger says in his paper that the action of subconjunctival injections is merely in altering the processes of absorption; probably the lymph current is accelerated and the carrying off of infectious matters facilitated. This is a very plausible explanation. Further, Mellinger declares that injections of salt have the same favorable effects as injections of bichloride, and lack the objectionable results of the latter. When he has furnished enough convincing observations to support this statement, I shall congratulate him on his simplification of local ocular therapy. At any rate, Mellinger has obtained results from injections of salt. I have myself used salt solutions, but without getting results equal to those following the use of bichloride.

There follow histories of cases in which the author has compared the results after using salt with those after using bichloride, to the advantage of the latter. The author also analyzes the case-histories given by Mellinger, and shows that the injections probably were of considerable service, although Mellinger considered the beneficial effects of the injections slight and thought that they sometimes did harm.

XX.—TWO CASES OF MALIGNANT GLAUCOMA.

BY PROF. E. ADAMÜK, KASAN.

CASE I.—G. P., aged thirty-four, consulted me after having lost the sight of his right eye. When examined, the eye was hard, the pupil dilated, the disc cupped, V = 0, but there were no hemorrhages or other changes in the choroid or retina. A dull pain in this eye some weeks before caused him to cover the other eye, when he found that the right eye was blind. An iridectomy was done, and the eye did well until the fourth day, when the lips of the wound were found open and the anterior chamber flat and containing blood. The wound then closed and opened again repeatedly. The cut edges of the iris prolapsed and were abscinded; and, finally, after several weeks a flat scar was obtained.

Some time later, the sight of the other eye began to be periodically blurred and gradually reduced. In my absence an operation was delayed, and when finally performed by a competent operator, it was followed by iritis and slow and uneven healing of the wound and eventual complete loss of sight.

In many glaucoma patients I have seen a tedious healing with slow restoration of the anterior chamber, but the disposition to a repeated reopening of the wound is a special characteristic of malignant glaucoma.

CASE 2.—S. K., a peasant woman of fifty-two, came to my clinic with an absolute non-inflammatory glaucoma in the left eye, and with a beginning glaucoma in the right, which reduced the vision to $\frac{20}{40}$. Tension was increased in both, but there were no signs of inflammation and no hemorrhages. An iridectomy was done in each eye, followed by tedious hemorrhage into the anterior chambers. The following day and afterwards there was considerable pain. Iritis developed and the eyes remained hard, sight in the previously good eye being much reduced. A second iridectomy in each eye was followed by similar hemorrhage and iritis.

The question arises whether in cases of malignant glaucoma it would not be better to do a sclerotomy on the second eye. But when one remembers how slowly wounds in such eyes heal, it seems likely that even sclerotomy with its delayed healing would be followed by bad results. It should, however, be definitely settled that when the results of an iridectomy in one eye are a delayed healing and a decrease in vision, iridectomy should not be done in the second eye, but operative procedures should be limited to a small sclerotomy or to paracentesis of the cornea.

XXI.—THE BACTERIA OF THE CONJUNCTIVAL SAC IN THE HEALTHY EYE.

BY DR. S. LACHOWICZ, WILNA.

A platinum loop, after being sterilized in a flame, was passed three times over the conjunctiva of the lower lid in a direction from out inward, and the liquid so obtained was inoculated on an inclined surface of agar in a test tube. Any colonies developing on the agar were inoculated on gelatine. The healthy eyes of 32 persons were thus tested. In 31 per cent. bacteria were found, in 69 per cent. they were wanting. Only a fourth of the persons whose sacs contained bacteria had them in both eyes. My findings of cocci agree with those of earlier observers, the staphylococcus pyogenes albus appearing in the four eyes of two persons, the micrococcus candidans in two eyes of two persons, the streptococcus pyogenes in one eye, the sarcina lutea in two eyes of two persons, the micrococcus coronatus in four eyes of two persons. Of bacilli I found a club-shaped rod (bacillus sporiferus, Bujwid) in one eye, the bacillus fluorescens putridus in one eye, the bacillus granulosus (the bacillus xerosis conjunctivæ of many authors) in three eyes of two persons, and a new bacillus in one eye.

Nearly all of these micro-organisms are such as are found in air or in water, and only the staphylococcus pyogenes albus and the streptococcus pyogenes are ever pathogenic.

My own conjunctiva, which, after three examinations, was found to be sterile, was inoculated in turn with pure cultures of each of the micro-organisms found in the other eyes, excepting the streptococcus pyogenes, the xerosis bacillus, and the sarcina lutea, of which cultures were not at hand when the inoculations were made. None of these caused the slightest irritation, and every one disappeared from the conjunctiva in the course of a few days, although the length of time they remained varied with the different micro-organisms.

XXII.—ON THE MECHANISM OF ACCOMMODATION.

BY PROF. C. SCHWEIGGER, BERLIN.

In the extraction of senile cataract by the flap operation downward, it occasionally happens that an unintentional innervation of the ocular muscles, immediately after the section is completed, forces the lens, with its capsule unruptured, out of the eye. The lens then ordinarily preserves its senile, flattened form, but at times I have observed that with liquefaction of the cortex the extruded lens in its intact capsule exhibits the round form which is found post mortem in the eyes of the young. Since the liquefied cortex can have no particular elasticity, this fact can be explained only as being due to the elasticity of the lens capsule, and it is also conceivable that an elastic membrane filled with soft contents should naturally take on a spherical shape when this is not prevented by a counter-traction. The greater thickness of the anterior capsule thus explains also its greater curvature in accommodation. The evident change in the form of the lens in accommodation is usually explained as being due to the effort of the lens substance to assume a spherical shape. This view, doubtless, proceeds from the idea of the "musculus crystallinus," held by the older anatomists (Loewenhoek, Pemberton, and also Thomas Young), yet I believe, on the ground of the preceding observation, that the elasticity of the lens capsule alone is sufficient to produce the change in shape, while the lens proper plays a more passive rôle.

So long as the lens is young and soft, and offers only a slight resistance to a change in shape, the elasticity of the capsule predominates, but when the lens becomes gradually harder, it offers a constantly increasing resistance. If then the cortex becomes liquefied in senile cataract, the elasticity of the capsule again predominates, and it approaches the spherical shape as soon as it ceases to be held tense by the zonula.

XXIV.—THE ANATOMICAL FINDINGS IN SPONTANEOUS CONNECTIVE-TISSUE NEW FORMATION IN THE VITREOUS (SO-CALLED RETINITIS PROLIFERANS).

BY DR. RUDOLF DENIG.

The patient from whom the eye was taken at the autopsy died at the age of sixty-two. Two days before death I found in both eyes marked atheroma of the retinal vessels, numerous hemorrhages, and, in the right eye, the well-known picture of retinitis proliferans. The white bands, with their elevations and depressions, lay outward from the macula, and projected forward some distance into the vitreous. The patient presented general arterio-sclerosis, and died with cerebral hemorrhages.

When the eyeball was opened an elevation was found outward from the macula, having a height of 2 *mm*, and a maximum breadth of 3 *mm*.

Microscopic.—The retina, near the ora serrata, presents the picture of œdema of the retina (Iwanoff), large cystic cavities being present. Nearer the pole of the eye the cysts become smaller, and the retina is abnormal only in the hypertrophy of Müller's fibres. To the temporal side of the disc the cysts, here filled with colloid masses, reappear. The inner nuclear layer is here distorted and mostly destroyed, and the nerve-fibre layer has disappeared entirely. The retinal vessels have atheromatous walls, and particularly the choroidal arteries have walls so thickened as to obliterate the lumen entirely in some cases. In the elevated fold of the retina near the macula, Müller's fibres are hypertrophied, and there are cellular deposits of various sorts. A large retinal vessel breaks up into smaller branches and capillaries along the fold, and some of these pass out of the retina and end in the vitreous among the hemorrhages, apparently being in connection with the new formations in the vitreous. About these vessels are leucocytes, spindle cells, and fibrillæ. The new formation is partially covered with a membrane, which I take to be the hyaloid, and partly adjoins directly the coagula of blood.

The left eye exhibits similar retinal changes though in less degree.

To recapitulate, the chief changes are (1) atheroma of the vessels leading to hemorrhage, (2) œdema of the retina characterized by the presence of cystic cavities and hypertrophy of Müller's fibres, and (3) a very vascular connective-tissue new formation in the vitreous resting on an elevated fold in the retina.

REPORT OF THE PROCEEDINGS OF THE OPHTHALMOLOGICAL SECTION OF THE SIXTY-FIFTH ANNUAL MEETING OF THE BRITISH MEDICAL ASSOCIATION, AT MONTREAL, SEPTEMBER 1 TO 4, 1897.

By Dr. J. A. SPALDING, Portland, Maine.

After a day of preliminary work of the Association, consisting in a service in the Cathedral Church, where a noble sermon was delivered by the Lord Bishop of Niagara, and in an afternoon of addresses of welcome and of information concerning the Dominion of Canada as a whole, by many distinguished medical and political personages, including the Governor-General, the Premier, Lord Lister, and others, the actual Sectional work began at 10 o'clock on the morning of Wednesday, September 1st.

The Section on Ophthalmology met in one of the delightful recitation rooms of the Engineering Department of McGill University, Mr. Edward Nettleship, F.R.C.S., of London, the President, in the chair. After a brief address of welcome, and of regret that so few of the Ophthalmic Surgeons of Great Britain were on hand, and of outline of the work to be done, the meeting opened with the presentation of a recent case of **Mules's operation** on a boy of ten, by Dr. Buller, of Montreal. The result was very good, and the mobility of the artificial eye on the inserted glass globe remarkable.

Dr. H. D. Noyes, of New York, then began the discussion of the chief topic of the day, **Antisepsis in Ocular Surgery,** in which he detailed all of the minutiæ of modern antiseptic surgery on the eye: the preliminary care of the patient; soap and water to the face and surrounding region; boric acid for the same district after the preliminary washing; hot water, carbolized, for the instruments; a pad to cover the eye to be wet in a 1 to 2000 bichloride solution ; the instruments to be put into actually boiling water ; then to be placed for a while in pure alcohol just before the operation ; next great care for cleanliness by the operator himself ; and sterilized dressings for the eye after the operation was done.

All solutions to be used about the eye before or after operations should be thoroughly sterilized,—atropine or cocaine or any other. All coverings to the eye after an operation should be soaked in 1 to 2000 bichloride, and should remain *in situ* at least twenty-four hours ; possibly it were better to let them remain longer than that. If the anterior chamber is to be irrigated, it should be done with a bulb-syringe—that is to say, not with a piston syringe,—and using weak boric-acid solutions. At present Dr. Noyes does not irrigate the anterior chamber at all, and he has abandoned all solutions of iodide of mercury, and indeed other preparations of that drug for such a purpose. Irrigation should not be done with a solution stronger than two per cent. strength of boric-acid solution.

Dr. Noyes thought that two cases of corneal suppuration that he had seen after cataract extraction were due to defective plumbing in the rooms where the patients remained in bed after the operation. Personally, he preferred moist dressings to an eye after operations, and he insisted on their remaining *in situ* a whole day at the least. Inspection of the eye at that time after an operation was very desirable, even imperative, and if any suppuration were present, he should rely on hot boric solutions (106° to 110° F.)

These remarks were made without notes and were characterized by great clearness of intention and definition, and extreme fluency of diction, and were received, in closing, with gratified applause from the audience, which by this time amounted to about thirty-five members present.

The discussion of the topic was then taken up by many members, and of what each one said, a brief résumé now follows.

Dr. Randolph, of Baltimore, thought that the use of too hot applications for the instruments to be used in operations on the eye was likely to dull the edge of the knives especially, and for that reason he did not put the instruments into too hot aqueous solutions but into alcohol. He also paid extreme attention to the condition of the lachrymal secretions, and irrigated the sac very freely with boric acid in distilled water.

Dr. Buller, of Montreal, thought that a preliminary bandaging of the eye for a day or two before the operation was uncalled for; he simply applied absorbent cotton dry, and dusted with boric acid finely powdered. He uses no mercurial solutions in the eye, and relies on moist dressings and a firm, though light bandage after the operation.

Occasionally a dry iodoformed bandage may be used after the operation. In cases of chronic eczema about the face in the region of the eyes and lids, he used before asepsis to have suppuration of the cornea, but now gets good results after careful antiseptic preparatory treatment, as well as at the time of the operation.

Dr. E. Jackson, of Philadelphia, thought that any preliminary bandage was bad practice, as it puts the eye into a worse condition to bear the operation. As the nose is often the starting-place for lachrymal difficulties, the nostrils ought to be carefully examined, and treated wherever there is suspicion of lachrymal disease in eyes to be operated on with a corneal incision. Antisepsis in any operation on the lens, means also a thorough removal of all lens substance and irrigation of the anterior chamber.

Dr. Fryer, of Kansas City, would like to continue the preliminary treatment of the eye with weak solutions of bichloride (1 to 6000) from one to three weeks before operation. He thinks he gets better results in that way. He does not care for boric acid, thinking it no better than hot water or the normal salt solution.

Dr. Rivers, of Denver, uses a 1 to 5000 bichloride solution for all operations in which the eye is to be opened. He believes in a prolonged preliminary treatment, and in thus destroying the germs that infect the eyes. He sterilizes all water for solutions just previous to the operation on the eye.

Dr. Mittendorf, of New York, thought that boric acid helped to keep atropine and other solutions in better condition, and was much in favor of boric acid and vaseline as an after dressing for operated eyes.

Dr. Ryerson thought that some operators carry asepsis on the eye too far, and he could see no good, for instance, in rubbing and scrubbing the under surface of the upper lid. He was in favor of irrigating the anterior chamber freely.

Dr. Wuerdemann, of Milwaukee, prepares his own solutions so as to be sure that they are aseptic. He approves highly of holocaine in one half per cent. to one per cent. solutions. It is as germicidal as bichloride 1 to 10,000, and has no ill effect on the cornea.

Dr. Calhoun, of Atlanta, had had good results in operations on negroes under the worst septic conditions. The conjunctiva of the negro will not tolerate any cocaine stronger than one half or possibly one per cent. solution, nor will it tolerate more than 1 to 10,000 bichloride. He uses boiled water, which is as good as boric-acid solutions, and has seen but very few cases of suppuration in the negro's cornea.

After brief remarks by Drs. Charles H. Williams, of Boston, Alt, of St. Louis, and Baker, Dr. Howe, of Buffalo, thought that we ought to leave the question of the best aseptic agent to the bacteriologists.

Dr. Spalding, of Portland, Me., suggested the closure of the puncta with a hot wire where we had reason to think the lachrymal secretions dangerous, and then opening them later. He was in favor of boric-acid preliminary treatment, especially in skin diseases about the eye, and favored as exact asepsis the removal of an old and sightless stump in one orbit previous to attempting any operation on the other cataractous eye.

Mr. Edward Nettelship had sent circulars on this topic to his confrères in Great Britain, with the result of finding them unanimous in exercising the greatest care in preparing patients, the room for the operation, hot-water solutions, care in cleansing the eyelashes and eyebrows, and the lachrymal secretions. In regard to the last there was a diversity of opinion, probably the best means being extirpation of the sac in bad cases, though we might treat it with probes or introduce a style of iodoform and gum if the passage is widely open. Instruments should be put in boiling water, though some thought it dulled the edges [Why not examine with the microscope the effect of boiling hot water on the cutting edges of knives used for the eye ?—J. A. S.], then in hot water and carbolic acid 1 to 40. He sees no harm in putting knives for a brief moment into boiling water. Most English operators use their instruments wet, right from the hot carbolic solutions or from the hot water plain. Only few Englishmen used sterilized dressings after operations, and either wet or dry seems to make but slight difference. Preliminary treatment is usual. He uses boiled distilled water and always washes out the upper *cul-de-sac* of the conjunctiva. Some wipe the inner surface of the lids with dry wool. So that on the whole the prevailing idea is asepsis, and thorough cleanliness.

In conclusion, Dr. NOYES reverted favorably to the various points raised, and remarked that so far as removing an old sightless stump was concerned, he used to do so ten years ago but did not do so now, and had no reason to think that any harm had thus resulted to his patients.

Dr. F. BULLER next read a paper on **Mules's operation,** or rather on a modification of the same as first described in the *Transactions of the Ophthalmological Society of the United Kingdom*, vol. v., p. 200. The reasons for the need of a modification were the frequently intense pain and the extrusion of the glass globe in a large percentage of instances, both of which were probably due to the circular opening, the use of catgut suture, and no means to prevent the conjunctival secretions from reaching the imperfectly closed wound. Buller, therefore, makes two triangular openings in the sclera, their bases joining in the centre of the cornea, forming thus a large *vertical opening in the sclera*, which offers plenty of chance for cleansing and inspection and excellent closure. White and black china-silk sutures are employed in the sclera and conjunctiva respectively. The contents of the globe are scraped out with a Volkmann's spoon, and the most rigid asepsis is carried out. He does not wait for all bleeding to cease before terminating the operation. There is no change of dressing for two days, unless pain is intense, when he uses cold applications, with frequent changes. He thinks the operation is preferable to enucleation, evisceration, or optico-ciliary neurotomy. The latter he has never tried after seeing a case in which after this operation sympathetic ophthalmia ensued. He sees great advantages in a stump thus operated on, over enucleation, as it gives better movement to the artificial eye and leaves a healthy conjunctiva that is not constantly irritated by retained lachrymal secretions.

Dr. G. M. GOULD, of Philadelphia, followed with a report of two very rare cases of **Retinitis pigmentosa without typical pigmentation,** in which he related the history and showed the visual fields of a sister and brother who had applied to him for disturbances of vision. The sister applied first, owing to loss of sight and asthenopia, and after mentioning previous loss of sight at night and in darkened halls or corridors, careful tests were made with the perimeter, which showed to the author's satisfaction that the case was one of retinitis without the pigmentation, all that the ophthalmoscope revealed being striæ in the choroid. At this point the brother was examined and similar defects discovered. There were also traces of a similar affection in the progenitors of the family, though no examinations were ever made. Dr. Gould, urged more careful tests of the field, in all cases where patients walked with the "Bowed Head," as he expressed it, meaning holding of the head forward in order to see better downward whilst walking in unknown districts, thus foreshadowing an affection of the periphery of the retina, and consequent limitation of the visual field.

In the discussion, Dr. Howe, who has studied retinitis pigmentosa very extensively, thought that cases like these were actually not so rare, but often overlooked. Now that attention had once more been called to them, others were likely to crop up into public notice.

Dr. Charles Lee, of Liverpool, read (or presented for reading) a paper on **A curious tumor springing from the orbit and side of the nose close to the inner canthus,** which then spread in a reddish mass all over the neighborhood. On operating, the tumor was found to extend into the maxillary antrum, but as the patient's consent to the removal of the entire superior maxilla had not been obtained previous to the operation, these latter masses were obliged to be left behind. Later, the patient refused to have any further operation done, and disappeared from view. Some months later, Dr. Lee had a letter from a fellow practitioner in the country, telling him, not that the patient was dead, of a malignant tumor (for microscopic examination at the time of the operation showed what appeared to be a round-celled sarcoma), but that he was alive and that all traces of the tumor had disappeared. The patient, it seems, having heard of the cure of cancer by cinnamon juice, procured some cinnamon and, making a strong infusion, took the same regularly for some months, with the above-mentioned remarkable results.

A very interesting and important case of **Metastatic carcinoma of the choroid** (primary disease in the thyroid) was communicated by Dr. Mathewson, of Montreal, and the President showed a specimen of a similar condition which had been sent from the Moorfields Hospital by Mr. Devereux Marshall.

On the President's desk during the session were displayed a number of fine specimens imbedded in glycerine jelly, and presented for observation by Mr. Charles Marshall and Mr. Priestley Smith.

Thursday, September 2d, the meeting was opened as before by the President, and the first paper read by Dr. ALT of St. Louis, on the **Histology of an unusual case of total blindness after injury to the skull.** This is the first case on record of a *recent* choroidal rupture being histologically examined. The patient was accidentally shot with a revolver bullet in the left temporal region, and the eye, after being totally blind, was enucleated a few days later owing to enormous exophthalmos from the abundant orbital hemorrhage. Without sympathizing with the necessity for the removal of the eye, Dr. Alt spoke at length of the histological details, and referred fully to the literature bearing on the topic. The patient recovered, but no trace has yet been found of the bullet, which is supposed to be lodged in the frontal sinus.

Dr. REEVE read a paper on **Experiences with cataract,** suggestive with practical points, but without any statistical tables. Thus, the patient was not to have magnified to him the operation. The practitioner was not to call in the services of a second practitioner in order to magnify to the patient the seriousness of the whole affair. The writer preferred to operate alone, rather than to have unskilled assistance, if such a term can be used. He does not operate unless the second eye is also affected to quite a degree of blindness. On the contrary, do not wait till patient loses sight totally in both eyes, because it acts depressingly. He generally waits for ripeness of cataract, but does not hesitate to operate on immature, smoky, or dark cataractous lenses. He does not like Foerster's manipulation to ripen the lens, but Bettman's. And, nevertheless, he prefers to operate at once rather than to ripen preliminarily immature, hard cataracts. He rarely does a preliminary iridectomy. He presses out the puncta and canaliculi before operating. He always makes a small iridectomy.

He uses boric acid exclusively as an antiseptic lotion, cocaine sterilized, makes a small flap, often removes flakes of cortex with forceps, and is careful to remove the speculum after the section is finished. He covers the eye with a pad, light bandage, and mask. Simple extraction is done in docile patients, who are in the minority in his practice. He does not like eserine, and pays no attention to prolapses unless large. He often removes a bit of the capsule with the forceps. Subsequent capsulotomy is done with Knapp's knife-needle. He has seen three cases of destructive hemorrhage after extraction. In cases of dislocation of the lens, he contracts the pupil with eserine, and then makes the corneal incision.

Dr. G. T. STEVENS, of New York, spoke on **A suggestion regarding an element in the ætiology of trachoma,** in which he supported the theory that an anomalous position of the horizontal plane of the eyes was the cause of trachoma, the eyes being elevated and the nervous force of the eyelids and eye muscles pressing the eyes downward so as to see well below the horizontal plane being the exciting cause of trachoma. He had seen cases of unilateral trachoma in which the eye affected deviated upward more than the other, and consequently suffered from the trachomatous disease, and was cured by proper lenses and muscular correction. The real causation of the deviation of the horizontal plane of the eyes was the result of the malformation of the skull.

The discussion took a wide range, and, amongst others, FOUCHER, of Montreal, remarked that in Canada Indians there were very few cases of trachoma, but in Manitoba Indians it was not rare at all. He thought this might be due to excess of snow and glare on the ice and snow in the latter country.

Dr. G. M. GOULD was quite unable to see how eyelid-pressure could produce trachoma at all.

Dr. PROUDFOOT remarked on the rarity of trachoma in native Indians.

Dr. LUCIEN HOWE spoke of variations in the direction of the orbital axis as a possible cause. He thought the histology of the negro eyelid and that of the white man identical. He was quite sure that germs were the only cause of genuine trachoma. He had seen in Egypt epidemics of ophthalmia produced by flies carrying germs from diseased eyes to those that were healthy, and he had seen cultures made from the droppings of flies walking across a plate of clean glass. In Finland, smoky houses full of peat- and grass-smoke were a prevalent cause of trachomatous disease and of blindness.

Dr. RYERSON thought that trachoma was very rare in Indians, but that on the contrary pterygium was quite common.

Dr. OSBORNE had seen several thousand Indians, and had never seen a case of trachoma.

Dr. STEVENS thought that there were different degrees of rotation with different shaped heads, and this led to his examination of skulls, whereupon he found racial differences. He still thought that he had cured cases of trachoma in the manner indicated.

Dr. F. BULLER read a paper on **Abnormalities in the functions of the extrinsic ocular muscles,** laying down the points on which he treated certain patients with glasses, and others by correcting their muscular deviations. He regarded a normal adduction as 25°, and normal abduction as 5°; beyond that were abnormities. He only operated for loosening or making a graduated tenotomy in chosen cases. He did not operate in every case of muscular imbalance. He had operated on 110 cases, and thought that he had permanently relieved about nine tenths of them all. He had never seen a patient injured by the operation. The correction of any ametropia was the first step; the tenotomy only later, when refractive errors being corrected, imbalance persisted with nervous symptoms and headache. He had cured by operation two cases of esophoria with vertigo.

Dr. STEVENS thought that for the sake of comparison we should confine ourselves to similar methods of examination and similar terms. He regarded 8° as normal abduction, not 5°, and dilated on the various methods of examination, and spoke disparagingly of the results obtained by testing with Maddox's rod.

Dr. MITTENDORF thought there might be something wrong in these theories and operations, when they had to be repeated so many times. He thought that the ideal operation and results had not yet been obtained. In his opinion, graduated tenotomies are of benefit in but very few cases.

Dr. PROUDFOOT was of the opinion that if we corrected the minutest errors of refraction there would be very few cases needing any operation at all.

Dr. MARLOW thought that errors with Maddox's rod might be due to the greater refraction of a red glass. He corrected the slightest errors of refraction, under a mydriatic, used exercising prisms, and never operated until these things had been carefully attended to. He insisted on leaving the eye open after every graduated tenotomy.

Dr. LUCIEN HOWE thought that all of the cases occurring so often in anæmic patients, it would be useful to examine the blood and to treat them constitutionally. He had often found a plane glass and a change of air and scene useful in such cases.

Dr. RYERSON had cured a case of epilepsy by graduated tenotomy, but he never operated in the slight degrees.

Dr. TROW thought that abnormal ocular muscles could be benefited by general treatment. He had seen cases of slight amount of deviation made distinctly worse by the operation. He had seen a case of epileptiform seizures cured by general treatment and appropriate lenses without the operation.

Dr. BULLER, in closing, expressed the opinion that a uniform standard for all cases was impossible to attain. He had been pleased with the results obtained by Maddox's rod, but he acknowledged that he always found greater deviation by the rod-test than with the phorometer. He repeats his operations if the imbalance does not seem to be relieved; but, at the same time, he tries to correct it at the first operation if possible. He does not often have to repeat, except in the small degrees, where caution is needed at first not to cause over-effect. He does not recall operating more than twice, and, on being questioned, insisted that exact refractive correction was always the first thing done. His patients, he regretted to say, were unable to distinguish any difference between 0.12 and 0.25 of refraction. Every case of refraction in his practice, in persons of ordinary age, was done under the influence of atropine or homatropine.

Dr. JEHIN PRUME, of Montreal, read a paper on **The treatment of syphilitic eye diseases,** in which, after insisting on the advantages of mercurials and then dilating on the numerous inconveniences of the usual methods of administration of this powerful remedy, he urged the advantages of intravenous injections of the cyanide of mercury, beginning with minute doses and gradually increasing. He showed an antiseptic syringe made entirely of glass, with platinum needle, and reported a number of cases in which great benefit resulted from this treatment, where other forms of mercury had been used in vain. He had made over two thousand injections without harm, and with benefit in most patients.

Dr. Prume employs the cyanide of mercury, using one gramme in one hundred grammes of water, and of this he takes a syringeful containing one gramme of the fluid, and beginning with a quarter of a gramme, he gradually increases to one full cubic centimetre of the fluid. The vein is made prominent by bandaging the arm as for bleeding; the arm is kept horizontal and the platinum needle is passed lengthwise into the vein. He gives twenty injections, one every other day; then twenty more, one every third day; twenty more, one injection every fourth day; and, finally, one injection a week, and then the medicine is suspended. He thinks that there is no danger in the proceeding, and he reported cases of long standing in which great relief was obtained and vision noticeably increased.

Dr. E. Jackson presented a brief paper, with illustrations in color, of some cases of **Foreign bodies in the cornea.**

Dr. Randolph's paper was on **The use of salicylate of soda ointment in lanolin in cases of vernal catarrh of the conjunctiva.** This remedy was used in varying strength in each case, according to the exigencies of the condition of the eye, and was in the writer's opinion of great value over other remedies so far discovered. He used, generally, an ointment of from 1 per cent. upward to 5 per cent.

Friday morning, September 3d, the Section met at the usual hour, and a paper was read by Dr. Charles H. Williams, of Boston, on **Simulated unilateral blindness**, and a new test shown consisting of red and green corrugated discs, to be held in spectacle frames in such a way as to produce double images of confusion. After this, Dr. Williams explained in full detail his very useful apparatus for testing the color sense in railroad employees, as well as for testing the vision for colors and objects under unfavorable conditions of weather, fog, and smoke. A full discussion of the entire topic followed, showing the absolute need for such examinations as a duty to the travelling public and as part of public health investigations by physicians.

Dr. G. H. Burnham, of Toronto, read a paper on **The hypodermatic use of pilocarpine in eye diseases**, in which he advocated the use of pilocarpine in combination with other alteratives in deep-seated diseases of the eye. He invariably supplemented mercurials and the iodide of potassium with properly conducted pilocarpine injections, in syphilitic eye diseases as well as in all cases of irido-choroiditis. The injections were always given in the afternoon in bed, in order that, after the effect had passed off, the patients could have proper rest in bed and not be subject to the risk of taking cold by going out before the next morning. Several favorable cases were reported, but it would seem best to eliminate the action of the other remedies by total suspension of the same during the course of the injections, in order to discover where the most benefit resides.

One or two of the members present spoke of the loss of weight which some patients always meet with in going through with this method of treatment by pilocarpine.

Dr. Wuerdemann read an enthusiastic paper on **The advantages of sciascopy as a test for refraction and one standing high above all other methods.** He was not enthusiastic as a new hand at the sciascopic test, but he was so even after using it for ten years. It was preferable to any other means of testing the refraction, having, as a whole, advantages over any other single method. He also showed a new plane mirror to use in making the test, as well as a series of lenses for the patient to hold before the eye during the examination.

The brief discussion showed many members very much in favor of the test.

Dr. Proudfoot, of Montreal, presented a very interesting paper on **The value of weak lenses in certain cases of asthenopia**; and the President called attention to a new form of syringe for flushing the sac and lachrymal nasal passage.

In closing the session, the President thanked the members present for their interest in the work, spoke of what farther progress we might look for and in what directions, and pronounced the Congress adjourned.

After a vote of thanks to the Secretaries, an invitation from Dr. Buller was read, asking the presence of the members at the clinic at the Royal Victoria Hospital on the same afternoon, where, at four o'clock, Dr. Buller showed several interesting cases, including one of discission for myopia, and performed a nice cataract extraction with iridectomy.

In conclusion, the reporter wishes to offer many thanks to the Secretaries, Dr. Jehin Prume and Dr. Stirling, for frequent opportunities to look over all the papers, as read in succession, and also especially to Dr. Charles H. Williams, of Boston, who very kindly assisted the reporter in following out the discussions by offering him constant perusal of his abundant notes.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE FIRST QUARTER OF THE YEAR 1897.

By Dr. ST. BERNHEIMER, in Vienna ; Prof. C. HORSTMANN, in Berlin ; and Dr. P. SILEX, in Berlin ;

WITH THE ASSISTANCE OF

Dr. S. M. Burnett, Washington ; Dr. Dantone, Rome ; Dr. Herrnheiser, Prague ; Prof. Hirschmann, Charkow ; Dr. P. von Mittelstädt, Metz ; Dr. Sulzer, Geneva ; Dr. L. Werner, Dublin ; Dr. C. H. A. Westhoff, Amsterdam ; Dr. Schiötz and Dr. Ole Bull, Christiania ; Dr. R. Greeff, and Dr. Deus, Berlin ; Prof. Da Gama Pinto, Lisbon ; and others.

Translated by Dr. Ward A. Holden.

Sections I.–V. Reviewed by Dr. ST. BERNHEIMER.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS. STATISTICAL REPORTS.

671. Adamück, E. V. The diseases of the percipient apparatus of the eye. Kasan, 1897. 2 vols.

672. Massachusetts Charitable Eye and Ear Infirmary. 71st annual report, 1896.

673. Eye, Ear, Nose, and Throat Hospital of New Orleans. 6th annual report, 1896.

674. Brooklyn Eye and Ear Hospital. Report for 1896.

675. Stilling, J. The rudiments of ophthalmology. Vienna and Leipsic, Urban and Schwarzberg.

676. Fuchs. Text-book of ophthalmology. 6th edition, Vienna and Leipsic, Deutike.

The number of new eye patients treated at the Massachusetts Charitable Eye and Ear Infirmary (672) during 1896 was 15,359. The number of in-patients was 912. The total number of operations was 1928, including the minor—60 enucleations, 77 operations on the muscles, 52 on the iris, and 275 on the lens. The number of senile cataract extractions was 126. Of these, 45 were Graefe's, with no absolute losses and 1 p. l.; 40 simple, with no losses and only 1 as low as 0.05; 41 with buttonhole of the iris, with 2 losses and 1 "shadows." A carefully prepared table of these cases in the institution is given as usual.

Burnett.

The noteworthy features of the 6th annual report of the Eye, Ear, Nose, and Throat Hospital of New Orleans, Dr. H. D. Bruns, surgeon (673), as to its ophthalmological practice, is the complete tabulation of the age, sex, color, employment, with treatment, duration, and condition at discharge of every patient registered, numbering 2289 in all. There were 196 operations performed, among which were 23 extractions of senile cataract, 8 enucleations, and 21 strabotomies. Burnett.

During 1896 there were treated at the Brooklyn Eye and Ear Hospital (674) 9889 eye cases; 1326 operations were performed, including the minor; 48 extractions with iridectomy, 24 without; 19 enucleations, 46 iridectomies, 18 tenotomies, 2 removals of steel from vitreous with magnet. Burnett.

Stilling's (675) *Rudiments of Ophthalmology* is a carefully prepared book, clearly written and well illustrated. Particularly complete are the chapters on anatomy, physiological and pathological optics, methods of physical and functional examination, and anomalies of refraction and disturbances of motility.

The sixth edition of Fuchs's (676) text-book is enlarged, and contains many new illustrations, of which those illustrating the development of the eye are particularly commendable.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

677. Ewetzky. Cyclitis in a monkey after recurrent fever from inoculation. *Wjest. Ophth.*, 1897, No. 1.

678. Bullot. The action on the cornea of inhalations of chloride of ethylen.

679. Hjort. The after-treatment of cataract patients. *Nordisch med. Archiv*, Jubilee volume xxxi., Stockholm, 1897.

680. MacLaren. Intracranial aneurism treated by ligature of the common carotid. *Brit. Med. Journ.*, Jan. 2, 1897, p. 10.

681. Marshall, C. D. On tension in cases of intraocular tumor. *Trans. Ophth. Soc. Un. K.*, xvi., p. 155.

682. French, C. G. Description of an eyeball lost from gonorrhœal ophthalmia. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1897.

683. Conners, W. F. Amblyopia ex anopsia. *N. Y. Med. Journ.*, Jan. 2, 1897.

684. Burnett, Swan M. Some unusual congenital anomalies of the eye. *Ophth. Record*, Jan., 1897.

Ewetzky (677) inoculated a monkey with a couple of drops of blood containing spirillæ from a patient suffering with recurrent fever. Spirillæ were then found in the monkey's blood. A fortnight later the left eye became affected, and the following condition was found: Moderate perikeratic injection, a semitransparent exudation in the anterior chamber, punctate brownish-gray precipitations on the membrane of Descemet, no synechiæ, pupil dilated but responsive to light. Atropine and cocaine were instilled. Ten days later the eye was again normal. The right eye was not attacked. Hirschmann.

Inhalations of chloride of ethylen cause in dogs a porcelain-like opacity of the cornea, an increase in corneal curvature, and perikeratic injection. According to Bullot (678), the ethylen chloride collects in the anterior chamber, destroys the corneal endothelium, and enters the corneal substance. Puncture of the cornea prevents the development of the opacity, since the ethylen flows out with the aqueous humor.

For some time Hjort (679) has allowed his operative patients to go without being bandaged, and his results are the best possible. The old observation that many eyes bear a bandage badly, as well as the idea that the tears and the free movements of the lids remove the micro-organisms from the eye, first led the author to bandage his operated eyes for twenty-four hours only, and then to leave them open. As a preparatory measure epilation of the lashes is undertaken for the purpose of more easily cleansing the lid margins. In the course of the operation the only antiseptic used is 2-per-cent. boric-acid solution. After the operation is finished the patient is led to his bed by two assistants. The room is not kept very dark. The author believes that extraction without iridectomy is less likely to be followed by reaction than extraction with iridectomy. In three months 39 operations in which the ball was opened were done, with smooth healing in all.

SCHIÖTZ.

MACLAREN'S (680) patient, a woman aged forty, suddenly developed a cavernous-sinus aneurism on the left side, which presented the usual symptoms. The external rectus alone was paralyzed. V. normal. Pressure on the left carotid stopped the bruit. After ligature of the common carotid, all the symptoms disappeared in two days, with the exception of the paralysis of the external rectus, which recovered in three weeks. The arteries were atheromatous, and kangaroo tendon was used as ligature. (I have had a well-marked case in which the symptoms disappeared equally rapidly after ligature of the common carotid. It is now over two years since the operation, and the patient is as well as ever he was. During the recovery a temporary embolism of the central artery occurred, which lasted only a few hours.)

WERNER.

MARSHALL (681) examined 100 cases with reference to the tension, and arrived at the following conclusions:

1. The tumor has little to do directly with the tension of the eye, until it nearly fills the globe or perforates it.
2. The cause is closure of the angle of the anterior chamber.
3. Closure of this angle is more frequent in sarcoma of the choroid than when the growth is in the iris or ciliary body.
4. Diminished tension is not uncommon when the ciliary body is involved.
5. In sarcomata of this region the tension is not increased in the majority; a few of these have minus tension.
6. Most gliomata are accompanied by normal tension; a few have diminished tension.
7. The tension in many cases varies in different stages.

WERNER.

The interesting feature in this report (682) is the finding of the gonoccocci in the lymph spaces and in some of the smaller blood-vessels. These were accompanied by staphylococcus pyogenes extending as far back as the equator of the globe.

BURNETT.

CONNERS (683) reports four cases, three of which were convergent strabismus, in which the defective eye was, by exercise, improved very much, increasing in one from $\frac{6}{200}$ to $\frac{20}{40}$, in one from $\frac{4}{200}$ to $\frac{20}{100}$, in one from $\frac{10}{200}$ to $\frac{15}{40}$, and in another, not strabismus, from $\frac{15}{200}$ to $\frac{15}{15}$. BURNETT.

The first of BURNETT's (684) cases is a peculiar folding of the conjunctiva of both eyes at the inner canthus, below and encroaching on the inferior internal quadrant of the cornea. 2d. Congenital opacities of both corneæ, consisting of a circular band midway between the pupil and periphery of dense white, the intermediate substance being more translucent. 3d. Floating bands in the vitreous, with no history of trauma or inflammation, and considered congenital and due to defective development. All three cases are illustrated. BURNETT.

III.—INSTRUMENTS AND REMEDIES.

685. BRILIANTOW. On subconjunctival injections of parachlorphenol. *Dissert.*, St. Petersburg, 1896.

686. RECLUS. Eucaine and cocaine. *Acad. de médicine de Paris*, Jan. 16, 1897.

687. SMITH, PRIESTLEY. A new method of mounting ophthalmic specimens. *Ophth. Rev.*, xvi., p. 4.

688. RANDOLPH. Absolute alcohol as a disinfectant for instruments. A bacteriological study. *Trans. Amer. Ophth. Soc.*, 1896.

On account of the unpleasant effects of injections of bichloride, BRILIANTOW (685) undertook to substitute injections of parachlorphenol, which has a marked antiseptic action, is less irritating, and does not form insoluble combinations with the tissues. Injections of small quantities of a 1 %–2 % solution cause a feeling of burning, which passes away in a minute or two. In cases of corneal ulcer with hypopyon, the action was favorable; the ulcer cleared, the hypopyon disappeared, and the pain ceased. Two injections were sufficient. In cases of plastic iritis, the pain diminished and the atropine acted more energetically. In cases of trachoma and parenchymatous keratitis, the injections had no effect. HIRSCHMANN.

A comparison of the action and toxic qualities of eucaine and cocaine leads RECLUS (686) to the following conclusions. Eucaine is an actual analgesic nearly as efficacious as cocaine. In a field of operation anæsthetized half with cocaine, half with eucaine, the sensibility to pain is almost completely absent, but less so in the part treated with eucaine than in that treated with cocaine. The action of cocaine lasts twice as long as that of eucaine. Notwithstanding the statements of Liebreich, Veiscini, and Schleich to the contrary, eucaine is as poisonous as cocaine, as Pouchet found by forty-eight experiments on animals. What makes eucaine more dangerous than cocaine is the fact that the toxic symptoms are not preceded by prodromes. Subcutaneous injections of eucaine are painful and bring about hyperæmia of the tissues.

SULZER.

PRIESTLEY SMITH (687) hardens the eye in "formalin" and then preserves it in a 10-per-cent. solution in a glass jar, as in the glycerine-jelly method, except that it is closed by a perforated rubber bung, which is closed by a glass rod which supports the specimen. The water with which the formalin solution is made should be boiled and cooled, to prevent bubbles.

WERNER.

As a result of a large number of experiments, RANDOLPH (688) has arrived at the following conclusions: 1. That instruments are most frequently infected by exposure to air. 2. That under the ordinary surrounding conditions absolute alcohol is a valuable disinfectant for instruments; but that the septic character of instruments infected with a pure culture of staphylococcus albus is not altered by an exposure for twenty minutes to the action of absolute alcohol.

BURNETT.

IV.—ANATOMY.

689. ELINSEN, A. On the vaso-motor nerves of the retina, Kasan, 1896.

ELINSEN'S (689) investigations on cats and dogs showed that the vaso-motors of the retina form a part of the fibres of the cervical sympathetic, pass with the latter into the first cervical ganglion, enter the cranial cavity, and separate in the cavernous sinus into three bundles of different thickness. The thickest bundle passes with the oculo-motor nerve and its short root to the ciliary ganglion; the thinnest bundle passes to the ganglion of Gasser, and, with the ophthalmic branch of the trigeminus, through the long root, to the ciliary ganglion; the third, medium-sized, goes to the ciliary ganglion through the sympathetic root. From the ciliary ganglion the vaso-motor fibres enter the optic nerve and pass to the retina, where they apparently run with free ends in the vascular layer.

HIRSCHMANN.

V.—PHYSIOLOGY.

690. Laurenti, K. On the theory of the movement of sciascopic shadows. *Wjest. Ophth.*, 1897, No. 1.

691. Mesmet. The rôle of the anterior epithelium of the cornea in ocular exosmosis. *Soc. de biol.*, Jan. 9, 1897.

692. Gradle, H. On the correction of astigmatism by unequal contraction of the ciliary muscle. *Graefe's Archiv*, xliii., 1, p. 252.

693. Hess, C. On the existence of partial contraction of the ciliary muscle. *Ibid.*, p. 257.

694. Bull, G. J. The visual effects of refractive error. *Trans. Ophthal. Soc. Un. K.*, xvi., p. 200.

695. Allen, S. Busby. Heat waves and glare. *N. Y. Med. Journ.*, Oct. 10, 1896.

696. Stevens, G. T. Examinations by the tropometer, and some of the phenomena observed. *Ophth. Record*, May, 1897.

Laurenti (690) experimented with an eye model, constructed by himself and having an adjustable focus. He found that neither the size of the opening in the mirror nor the distance of the mirror from the eye examined had any marked influence on the accuracy of the determination of the astigmatism. Hirschmann.

In opposition to Leber's view, now generally accepted, that the endothelium on Descemet's membrane prevents the filtration of aqueous humor, Mesmet (691) believes that this rôle falls to the corneal epithelium. Anatomically the endothelium of Descemet's membrane differs little from the endothelium of serous membranes which offers no resistance to diffusion. This characteristic is common to all tissues of mesoblastic origin, while the chief protecting tissue, the epithelium of the skin, arises from the ectoderm, as does the epithelium of the cornea.

Clinically it is recognized that the bullous keratitis frequently complicating glaucoma is due to an elevation of the anterior corneal epithelium. The increased tension brings about inbibition of the cornea, since the barrier to the pressure is at the anterior surface of the cornea. By this experiment it can be shown that the cornea when deprived of its anterior epithelium is pervious to the aqueous humor. When an iron salt is injected into the anterior chamber, and a ferro-cyanide solution is spread on the surface of the cornea, the blue reaction appears only at the points where the epithelium is wanting; a lesion of the endothelial layer, notwithstanding Leber's views to the contrary, is not required in order to bring about the reaction. SULZER.

GRADLE (692) believes in opposition to the statements of Hess, that in an observation published in 1879, to which he now adds another, he has proved that many astigmatic persons are able in reading to lessen their astigmatism by means of irregular contraction of the ciliary muscle.

HESS (693) proves that Gradle's observations are not in the slightest degree adapted to render plausible the idea of a partial contraction of the ciliary muscle, which Hess declares cannot take place. Both of Gradle's patients had very poor vision.

In a very interesting paper of forty-seven pages BULL (694) describes the deformations of the visual images of test types, lines, etc., due to various refractive errors. He first illustrates, by means of photographs of the types, under a given error, the probable effect of such error on the visual images, and then explains how the real visual images differ from the photographic results. In the latter there is an even radial diffusion of all points of the image leading to a mere blurring and indistinctness, while the visual image resolves itself into several superposed mages, some of which not coinciding with the rest, stand out, as it were, causing monocular polyopia or diplopia. This occurs in all errors of refraction and is a natural consequence of the resolution of the visual image. When the photographic images are compared with the objects as seen by the eye rendered artificially ametropic, to the same extent as the photographic camera, it was found that the eye could distinguish letters which seemed very indistinct in the photograph, but this is due to information from movements of the head and eye, inclinations of the glass, variations in accommodation, which give different pictures for comparison. The photographs show very clearly that letters are more legible with simple astigmatism than with a corresponding spherical error, and moreover that indistinctness of the vertical elements of letters causes greater confusion than blurring of the horizontal, and therefore horizontal ametropia gives worse vision than vertical. Hence many patients are inclined to accept a + cylinder axis horizontal whether they need it or not. Bull does not think the letters in Snellen's types are suited equally well for all varieties of refractive errors. He would prefer the addition of such letters as S, Q, K, Y, and italics, etc.

The author also applied a photographic test, to determine if an astigmatic eye focuses for the mean point between its two principal foci, or if it focuses for one p. f., or alternately for both, and the result corresponding to alternate focussing proved immensely superior.

The result of overlapping diffusion circles on the different letters is also well described. For example in the letter O the central light area gradually gets smaller and smaller, until finally, when the shadows overlap the centre, the letter now looks like a dark spot, with an indistinct zone around it.

The author then proceeds to show that in the case of the eye, even where there is no astigmatism, the diffusion circle is not a disc of evenly diffused light, but that the light is concentrated at some points and diminished at others, the effect differing in each individual case and depending on the "star"-like image produced chiefly or altogether by the lens sectors. A number of examples are given, proving this by comparison of the "star" with the multiple images of a point or line when seen out of focus. In each case the polyopia or diplopia corresponded with the brightest points of the star. By taking photographs with a lens cut in sectors, the author succeeded in obtaining very good imitations of monocular polyopia. Monocular diplopia he thinks should be called, *the diplopia of the sectors of the crystalline lens.*

[This paper proved most interesting to me, as several years ago (1887) I noticed in my own eyes (myopia — 3, with 0.5 cyl. 15°), a very marked monocular diplopia. I subsequently found that this was a very common condition and could be produced in any person (if not observed) by putting on low cylinders. At first I was inclined to attribute it to astigmatism. On referring to my notes I find two passages which are very striking in relation to Bull's paper: 1. "On experimenting with a bright square (1 *cm*) at 2 metres away I could see several images, but noticed that two or three images were more distinct especially one above (corresponding to position of phantom)." 2. "The diplopia varies with accommodation and is apparently dependent on some lens sector whose image does not coincide with the rest." It also occurred to me to try the effect of photographing with a lens cut into sectors. I am very pleased to see my ideas verified by Dr. Bull's admirable investigations.—L. W.] WERNER.

In this paper ALLEN (695) shows from experiment and observation that while the yellow, red, and violet rays irritate the eyes, the blue, green, and brown soothe. BURNETT.

STEVENS (696) calls attention chiefly, in this paper, to the variations in the comparative excursive power upward and downward of the eye, as observed by the tropometer. He considers these movements more important than the lateral, and that variations of the lateral frequently depend upon changes in these. The normal upward limit is 33 °, the normal lower limit is 50 °, the total being 83°. If one is diminished, the other is usually correspondingly increased. BURNETT.

Sections VI–XI. Reviewed by PROF. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

697. HIRSCHBERG. On the change in myopia caused by removal of the lens. *Centralbl. f. prakt. Augenheilk.*, 1897, p. 65.

698. SALZMANN. The decrease in refraction following removal of the lens. *Arch. f. Augenheilk.*, xxxiv., p. 152.

699. FUKALA. The increase in acuteness of vision after myopia operations. *Graefe's Archiv*, xliii., 1, p. 206.

700. LEBER. Remarks on the acuteness of vision in highly myopic eyes. *Ibid.*, p. 218.

701. DE HAAS. The operative treatment of myopia. *Med. Weekblad*, 1897, p. 489.

702. ASCHHEIM. On a case of acquired corneal astigmatism of 32 dioptries. *Zehender's klin. Monatsbl.*, xxxiv., p. 108.

703. VISSER. The accommodation of astigmatic patients. *Nederlandsche Oogheelkundige Bydragen*, part 3, 1897.

According to HIRSCHBERG (697), the greater the original myopia, the greater the loss of action of the increased visual axis in the aphakic eye, *i. e.*, the greater the difference between the refractive condition before and after the operation. Hirschberg has done discission on 8 eyes with myopia from 15 to 26 D. The difference in refraction varied between 18 and 23 D. The greatest danger of the operation is detachment of the retina, which the author attributes to the numerous discissions which extend into the vitreous.

SALZMANN (698) shows that in removal of the lens the loss of refractive power is the greater the longer the optic axis. The deeper the anterior chamber before the operation, the less the change in refraction. The variability of the latter is due chiefly to the displacement of the principal point, and in less degree to the length of axis, but not to the change in focal distance.

The increased acuteness of vision after myopia operations is explained by FUKALA (699) as being due to the enlargement of the retinal images, their greater luminous intensity, and the fact that the optical apparatus is simplified, the lens reflexes being done away with.

According to LEBER (700), a marked increase in vision after removal of the transparent lens, which does not depend upon enlargement of the retinal images from the action of the correcting glasses, cannot be explained by a betterment of the optic conditions, but only by some influence upon the retina.

DE HAAS (701) reports the case of a man who had been operated on for cataract twenty-six years before with resulting $V = \frac{5}{10}$. Following this the retina at the macula underwent progressive myopic changes and vision steadily decreased.

WESTHOFF.

VISSER'S (703) observations show that the majority of patients with myopic or hyperopic astigmatism accommodate, in reading, for the meridian which is emmetropic or less ametropic.

WESTHOFF.

VII.—LIDS.

704. FABER. Botryomycosis of the eyelids. *Nederlandsche Oogheelkundige Bydragen*, 1897, 3, p. 24.

705. ULCY. Epithelioma of the upper lid ; blepharoplasty. *Annal. d'ocul.*, cxvii., p. 137.

706. RUMSCHEWITSCH. On the pathology of ectropion sarcomatosum. *Zehender's klin. Monatsbl.*, xxxiv., p. 1.

707. MITVALSKY. A contribution to the knowledge of the pathology of the Meibomian glands. *Centralbl. f. prakt. Augenheilk.*, 1897, pp. 47 and 73.

708. LANDOLT. A modification of the ptosis operation. *Arch. d'opht.*, xvii., 1, p. 4.

709. VAN DUYSE and RUTTEN. Double coloboma of the lids, an oculo-palpebral adhesion, and iridic anomalies on the left side. An undescribed anomaly of the lachrymal canal, and an incomplete, oblique, facial cleft on the same side. *Arch. d'opht.*, xvii., 1, p. 4.

710. DE HAAS. Membrana palpebralis perseverans. *Med. Weekblad*, 1896, p. 489.

711. Snell. Alveolar carcinoma of eyelid. *Trans. Ophth. Soc. Un. K.*, xvi., p. 39.

712. Mowat. Lymphangiectasis of right eyelids. *Ibid.*, p. 42.

713. Oliver. Description of a successful operation for blepharoplasty, embracing the outer halves of both the upper and lower lids by a single split flap taken from the forehead ; for epithelioma. *Trans. Amer. Ophth. Soc.*, 1896.

714. Oliver. Clinical history of an operation for cicatricial ectropion with advancement of the levator palpebræ muscle. *Annals of Ophth.*, April, 1897.

715. Gómez, V. A case of uniocular epicanthus. *N. Y. Med. Journ.*, April 17, 1897.

Faber (704) was consulted by a peasant of thirty, who complained of a small tumor which had developed four months before in the middle of the margin of the upper lid. Since then new nodules had appeared, causing an irregular thickening of the lids. On everting the upper lid, numbers of small nodules were found, each with a small opening in its centre, through which a cloudy mucoid mass could be expressed. This mass consisted of mulberry-shaped granules composed of spherical bodies 34 μ or less in diameter. The case was one of botryomycosis, which has hitherto been found only in the horse, where it develops in the funiculus spermaticus after castration and in the breast after injury from pressure. In 1869 Bollinger found botryomycosis in a horse's lung. Westhoff.

In ectropium of the lower lid there is a swelling of the conjunctiva due to the proliferation of the adenoid tissue in the region of the orbital margin of the tarsus and the retrotarsal fold. Rumschewitsch (706) finds, in opposition to Wolffing, that disease of the Krause glands does not play an important rôle in bringing about ectropium.

Landolt (708) operates for ptosis in the following way : 1. An incision 4 *mm* from the lid margin and parallel to it. 2. Dissecting up of the skin to the orbital margin, so that the lid is separated into a deep and a superficial layer. 3. Introduction of three sutures, each with two needles, into the margin of the wound and cartilage, passing the needles under the superficial layer of the split lid and bringing them out above the eyebrows, where the sutures are knotted so as to draw up the deep layer to the desired height. The skin of the lid hangs down over the lower margin of the lid and mostly resumes its old position after having shrunken. Sometimes the latter does not take place, and the result is unsatisfactory. Landolt therefore now puts three sutures through the superficial layer after the deep layer has cicatrized sufficiently to permit the removal of its sutures. By means of these second sutures the effect of the operation can be increased or diminished. v. MITTELSTÄDT.

VAN DUYSE and RUTTEN'S (709) patient was a male infant of ten months with a coloboma of the lids of the left eye and a cicatricial adhesion between the coloboma and the eyeball. This scar continued obliquely down the face, meeting one angle of a double hair-lip. The pupil was elongated upward and outward. v. MITTELSTÄDT.

In an infant aged three months DE HAAS (710) found the lids united by several thin tracts of skin attached to the lid margins between the cilia and the mouths of the Meibomian glands. These bands of skin were divided, and the eyes were found to be normal.

SNELL'S (711) patient, a woman aged thirty-one, noticed two years before a small pimple in the centre of the upper lid, and soon after a lump formed at the lid margin which grew slowly and painlessly and then ulcerated. Surface nodulated, yellow. Preauricular gland enlarged. It proved to be an alveolar carcinoma. WERNER.

MOWAT'S (712) patient was a boy, aged eight years. The eyelids were soft and swollen, pressure on the lower caused the upper to swell, and pressure on both produced a swelling behind the right ear. Condition first noticed three years ago. WERNER.

In OLIVER'S (713) case the upper lid was extensively torn by a blow from the horn of a cow, and the cicatrices resulting had produced a very extensive ectropion. The tissues were dissected apart, and then finally adjusted in their proper relations and sutured together. This relieved the ectropion, but there still remained a ptosis from separation of the levator palpebræ from its attachment to the tarsus. A curvilinear incision was made over the upper edge of the tarsus and the fibres of the levator carefully dissected out and loosened from the cicatricial adhesion and united by two deep sutures to the edge of the tarsus. The result was a perfect lid in appearance and movement. BURNETT.

OLIVER'S (714) case was a man of sixty-six who had an epithelioma of the outer angle of the right eye, embracing both lids, and commencing in a shell wound received at that point many years ago (1864). The growth embraced nearly the whole of the outer half of both upper and lower lids. The tumor was removed and the space filled in by a flap taken from the forehead and split to form the palpebral aperture. Photographs show the operation to have been very successful. BURNETT.

The noteworthy features of GÓMEZ'S (715) case are that the epicanthus was unilateral (left), and that it was due to the ravages of scleroderma. An operation relieved the deformity.

BURNETT.

VIII.—LACHRYMAL APPARATUS.

716. JÄNISCH. A case of tuberculous dacryo-adenitis. *Inaug. Dissert.*, Greifswald, 1897.

717. SÜSSKIND. A clinical and anatomical contribution to the subject of tuberculosis of the lachrymal gland. *Arch. f. Augenheilk.*, xxxiv., p. 221.

718. AHLSTRÖM. On the technique of extirpation of the lachrymal sac. *Centralbl. f. prakt. Augenheilk.*, 1897, p. 97.

719. ALT. Another case of tumor of the palpebral (accessory) lachrymal gland, including some remarks on tumors of the orbital lachrymal gland. *Am. Jour. of Opht.*, March, 1897.

720. TAYLOR, L. H. A case of foreign body in the canaliculus. *Ophth. Record*, Jan., 1897.

In an infant, aged eighteen months, whose father had tuberculosis, JÄNISCH (716) observed the development of a tumor as large as a walnut in the right lachrymal gland. The tumor when extirpated proved to be of tuberculous character. No other signs of tuberculosis could be found.

SÜSSKIND'S (717) patient was a woman of twenty-one. For two years and a half she had noticed the development of a tumor in the region of the lachrymal gland, which became as large as an almond and was freely movable under the skin and not firmly attached to the bone. The preauricular glands were enlarged. The tumor and the glands were removed and found to be tuberculous, the disease having extended into the parotid gland.

In extirpating the lachrymal sac, AHLSTRÖM (718) makes an incision 4–5 *mm* long through the anterior wall of the sac, and introduces the head of a hammer measuring 8 x 5 *mm*. This renders the wall of the sac tense and facilitates the extirpation.

The patient who furnished the specimen described by ALT (719) was a negro of twenty-nine years, who had noticed a lump at the outer side of the left eye for the first time four years previously. It was found to be a tumor of the accessory lachrymal gland, the orbital gland being unaffected. Examination showed it to consist of tubules of three kinds: 1. Remnants of normal glandular tissue. 2. Tubules which appeared solid and without a central lumen. 3. Tubules with wide lumen sometimes forming cyst-like cavities. Alt considers it an adenoma.

BURNETT.

In TAYLOR'S (720) case, a farmer who had been harvesting got a foreign body in the eye, which finally proved to be a wheat beard that had found its way through the upper punctum into the canaliculus, almost completely hiding itself.

BURNETT.

IX.—MUSCLES AND NERVES.

721. GRAEFE, A. The vision of strabismus patients. An ophthalmologico-physiological study. Wiesbaden, Bergmann, 1897.

722. LANDOLT. The etiology of strabismus. *Arch. d'ophtal.* xvii., 2, p. 74.

723. BERLIN. On a peculiar form of convergent strabismus, with myopia, and its treatment by means of concave glasses. *Festschr. d. Stuttgarter Aerztl. Vereins*, 1897, p. 320.

724. ZOTH. The action of the ocular muscles and the effects of paralyses. Leipsic and Vienna, Deuticke, 1897.

725. GULLSTRAND. On paralysis of the inferior oblique. *Nord. Med. Arkiv*, Jubilee volume, No. 11, Stockholm, 1897.

726. STRAUB. Congenital bilateral paralysis of lateral movement of the eyes. *Geneeskundig Tydschrift*, 1897, p. 209, and *Centralbl. f. prakt. Augenheilk.*, 1897, p. 8.

727. SPICER and ORMEROD. Recurrent paralysis of ocular nerves. *Trans. Ophth. Soc. Un. K.*, xvi., p. 277.

728. COLLINS, E. TREACHER. Paralysis of both internal recti muscles. *Ibid.*, p. 301.

729. TAY. Case of recent double ptosis with loss of convergence and weakness of internal recti; recovery. *Ibid.*, p. 302.

730. GRINSDALE. Recurrent paralysis of right third nerve. *Ibid.*, 298.

731. MacLehose. Paralysis of left external rectus; movement inward of the affected eye is associated with contraction of the orbicularis palpebrarum on the same side, and marked retraction of the left globe. *Ibid.*, p. 299.

732. Bennett, A. G. On the treatment of insufficiency of the internal recti muscles. *Annals of Ophth.*, Jan., 1897.

733. Hansell, H. F. A case of paralysis of the superior oblique in nephritis. *Amer. Journ. of Ophth.*, March, 1897.

734. Marple. Traumatic abducens paralysis complicated with facial paralysis, especially considered as regards localization. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1897.

735. Weeks. A case of injury to the motor oculi nerve followed by paralysis. *Ophth. Record*, April, 1897.

736. Wilder, W. H. Unilateral reflex iridoplegia. *Annals of Ophth.*, April, 1897.

737. Harlan, G. C. The pupil reflex in absolute blindness. *Trans. Amer. Ophth. Soc.*, 1896.

738. Colburn. Strabismus due to undeveloped or contracted check ligament, and operation for its relief. *Ophth. Record*, Jan., 1897.

739. Haynes, W. H. Recurrent ptosis. Report of a case with anæsthesia of supra-orbital branch of the fifth cranial nerve. *N. Y. Med. Journ.*, Feb. 13, 1897.

Landolt (722) seeks in his paper to give a comprehensive account of the development of strabismus, and to separate the actual from the doubtful or merely apparent causes. Among the former are, particularly, disturbances of binocular vision and anomalies of refraction, while disturbances of central innervation of the symmetrical muscular movements are rarer causes, and the muscle theory is unwarranted, although lack of harmony between retina and muscular apparatus, too great distance between the centres of rotation, abnormal divergence of the orbits, and a large angle α facilitate the development of squint.

v. Mittelstädt.

Berlin (723) reports a series of cases of convergent squint with myopia. The patients were between seventeen and twenty years of age, and were of either sex. The myopia was 5. or 6. D. The patients had never worn concave glasses. There was homogeneous diplopia noticeable only at a certain distance.

When concave glasses were worn the diplopia disappeared. Berlin refers this variety of squint to overstraining in near work. It is cured by wearing the proper myopic correction.

GULLSTRAND (725) reports two new cases of isolated paralysis of the inferior oblique. One patient, a boy of ten, had reduced vision from corneal scars; but the author, by his objective method, determined that there was paralysis of the right inferio oblique.

In the other patient, a teacher, there was, when looking up and to the right, vertical diplopia, with the image of the left eye higher—paralysis of the left inferior oblique. Besides these two, there are only three other cases in the literature that are to be regarded as pure. In but a single case were the double images, *lege artis*, homonymous.

In three of these five cases the cause was an injury in the infra-orbital region, wherefore the author concludes that it is possible to suppose that the defect in motility did not depend upon a paralysis, but upon elastic traction from cicatrices in the loose tissue of the orbit. SCHIÖTZ.

The author's (727) seven patients were all young, two to sixteen years of age. In three the third nerve was alone affected. All were accompanied by more or less headache and vomiting with the attacks. In one there was pallor of the optic nerve, and in another contracted fields. Twenty-nine recorded cases are tabulated. In some there is a family history of migraine, but none of the patients had scotomata or spectra with the headaches. Three cases revealed, post mortem, plastic exudation at the base of the brain, fibro-chondroma of the nerve, and tubercular disease of the nerve, respectively. Dr. ORMEROD had seen cases of paroxysmal headache followed not by ocular paralysis, but by œdema and ecchymosis of the eyelid. WERNER.

COLLINS'S (728) patient, aet. twenty-two, suffered from sick headache; he never had syphilis. Both internal recti were paralyzed. He recovered completely in some months' time under KI. WERNER.

BENNETT (732) has treated 46 cases of exophoria by prism exercise after the manner recommended by Gould. Of these 30 are apparently cured, and 9 benefited more or less.

BURNETT.

In HANSELL'S (733) case a man thirty-four had a sudden paralysis of the superior oblique on the left side. There was no history of syphilis, but an examination of the urine showed albumen and casts, which, however, disappeared later under diet and treatment. There was no disturbance in the eye grounds.

BURNETT.

MARPLE'S (734) case was a man of thirty-five who was struck on the head and remained unconscious for 5 days. On recovery there was paralysis of the right abducens and the facial on that side. A year after the accident the condition was practically the same. A résumé of other published cases is appended to the history. BURNETT.

WEEKS (735) reports a case where a man was struck by a fencing foil on the nasal process of the superior maxillary bone, not implicating the soft tissues of the orbit. Total paralysis of the third pair on that side immediately followed. There was no headache or other general symptoms. In a little over a month and a half the function of the muscles was completely restored. Weeks thinks the lesion situated at the sphenoidal fissure, a blood clot probably, which was absorbed. BURNETT.

WILDER (736) reports two cases of iridoplegia, one in a woman and the other in a man, both in the right eye in which there was at the same time a paresis of A. The pupils while not responding to the stimulus of light, promptly acted under the use of accommodation and convergence. There was no history of syphilis in either case. The eyes were otherwise normal as to their structure, but there were refractive errors. BURNETT.

HARLAN (737) instances four cases of absolute blindness in which the pupil remained large and motionless when exposed to ordinary light, and that from the ophthalmoscopic mirror, yet contracted when exposed to a strong light, particularly sunlight. BURNETT.

COLBURN' (738) reports four cases of strabismus due not to anomalies of the muscles, but to faulty development of the static soft structures—that is, a contracted or undeveloped cheek ligament restraining the abductors in their attempt to produce parallelism or rotate the eyes through the entire lateral range. The operation consists in first carefully dividing the tendon, leaving a few fibres above and below, then dividing the check ligament outside of the muscle freely, and if necessary advancing the opposing muscle. The steps of the operation are illustrated by diagrams. BURNETT.

HAYNES'S (739) case was a boy of seven, with the history of no disease or dyscrasia except a mild attack of measles when six months old. Two months later occurred the first attack of ptosis on left side. When two years old another attack; when five another; at six another, and milder attacks since. He has now mild paresis of all the muscles supplied by the third pair of left eye. BURNETT.

X.—ORBIT AND NEIGHBORING CAVITIES.

740. SCHREIBER. Report of three cases of orbital tumor removed by Kronlein's osteo-plastic method. *Report of Schreiber's Eye Institute*, at Magdeburg, for 1896.

741. VALUDE. Recurrent orbito-palpebral hæmatoma in a hæmophile. *Annal. d'ocul.*, cxvii., p. 190.

742. PIQUÉ. A case of pulsating exophthalmus. *Soc. de chir. de Paris*, Feb. 10, 1897.

743. SCHIMANOWSKY. The question of pulsating exophthalmus. *Wjest. Ophth.*, xix., 1, p. 1.

744. LEJORS. Exophthalmic goitre. *Soc. de chir. de Paris*. Feb. 10, 1897.

745. JOUNESCO. Complete bilateral resection of the cervical sympathetic in the treatment of exophthalmic goitre. *Ann. d'ocul.*, cxvii., p. 161.

746. CANT, W. E. Cyst of the orbit. *Trans. Ophth. Soc. Un. K.*, xvi., p. 171.

747. WILLIAMSON, R. T. Remarks on the prognosis in exophthalmic goitre. *Brit. Med. Journ.*, Nov., 1896, p. 1373.

748. TILLEY, H. Remarks on the operative treatment of a case of double frontal sinus empyema, complicated by double antral suppuration. *Ibid.*, Jan. 23, 1897, p. 197.

749. WEEKS. Actinomycosis of the orbit and eyeball, occurring in a parrot. *N. Y. Eye and Ear Inf. Reports*, Jan., 1897.

750. JENNINGS, J. E. A case of scirrhotic carcinoma of the orbital lachrymal gland. Microscopic examination by A. Alt. *Amer. Journ. of Ophth.*, April, 1897.

751. BULLER. The treatment of dermoid tumors of the orbit. *Trans. Amer. Ophth. Soc.*, 1896.

752. SATTLER. Ivory exostosis of the orbit. *Trans. Amer. Ophth. Soc.*, 1896.

753. ALT. A case of endothelioma of the dura mater and brain. *Amer. Journ. of Ophth.*, Jan., 1897.

754. PARK, J. W. Anophthalmus. *Ophth. Rec.*, Jan., 1897.

VALUDE'S (741) patient, a bleeder of thirty-four, exhibited a swelling of the right eyelids which soon extended to the cheek and forehead. The patient at this time complained of pain at the upper-inner angle of the orbit, where two days later ecchymoses appeared, which extended to the lower lid. The condition was improving, when ten days later the swelling began to increase. Puncture of the orbit revealed the presence of pure blood. These hemorrhages recurred, but had no relation to the menstrual periods, which were regular. SULZER.

SCHIMANOWSKY (743) observed pulsating exophthalmus in a woman of fifty-two who had fallen backward three months before, striking the occipital region and causing hemorrhage from the nose and mouth (fracture of the base). The exophthalmus came on six weeks after the injury, and was accompanied by annoying sounds in the head. Vision normal; divergent strabismus; crossed diplopia; exophthalmus of the left eye, which is displaced downward and outward, and its motility upward and inward diminished. The conjunctival vessels are injected; the left cornea is dull; the left pupil dilated. Light reaction normal. The eye pulsates synchronously with the heart; the angular vein is dilated and pulsating. In the upper-inner angle of the orbit can be felt a pulsating tumor half as large as a pigeon's egg, which is in connection with the angular vein. Pressure on the left common carotid stops the pulsation and bruit and the subjective sounds. The left common carotid was ligated in the trigonum caroticum, immediately after which the exophthalmus diminished, and in two days all the symptoms had disappeared. Six days after the operation all the symptoms returned, but gradually diminished. The final result was only a partial success. The symptom complex in these cases is directly due to rupture of the carotid in the cavernous sinus. In future cases the author will not tie the carotid, but will undertake to ligate the upper orbital vein, which he believes to be feasible.

HIRSCHMANN.

LEJORS (744) records a case of Basedow's disease in which death followed some hours after extirpation of the right lobe of the thyroid gland. No cause could be found for the sudden death as the operation was done without any complications. So far 29 fatal cases have been recorded and in the other cases disturbing symptoms have been frequently observed just after the operation.

SULZER.

The favorable but incomplete results of partial resection or cuting through the cervical sympathetic in Graves's disease have led Jounesco (745) to undertake its complete bilateral resection. An incision through the skin beginning at the mastoid process and following the margin of the sterno-cleido-mastoid to the clavicle, gives access to the jugular vein which is ligated in two places and divided. The exposing of the posterior margin of the sterno-cleido-mastoid necessitates cutting the branches of the cervical plexus. The trunk of the cervical sympathetic must be sought for in the middle of the region of operation. The isolated nerve trunk serves as a guide for finding the upper, middle, and lower cervical ganglia. In three of his six operations the author was forced to omit the resection of the lower ganglion. The removal of the upper ganglion immediately brings about contraction of the pupil and congestion of one half the face and secretion of saliva and tears. These symptoms soon pass off and the results of the operation are trivial. Among the six patients two had Basedow's disease. The resection of the sympathetic led in both cases to the disappearance of the exophthalmus, with decrease in size of the thyroid and a slight lessening of the frequency of the pulse. SULZER.

CANT'S (746) patient, a man aet. twenty-four, had a protruding eye from boyhood ; never any pain. There was a fulness in the temporal fossa which was elastic, and transmitted pressure to a solid projection above the eyeball, which proved to be the lachrymal gland. The cyst contained a clear brown fluid. The outer wall of the orbit was wanting. After incision, drainage, and cautery, the cyst closed up in two years.

Argyll-Robertson stated that a friend of his adopted the plan of introducing a small piece of solid silver nitrate into these orbital cysts, to cause sloughing of the walls. WERNER.

WILLIAMSON (747) followed up 32 cases of this disease with this result :

Fatal,	6 cases.
Recovery,	5 "
Recovery almost complete,	2 "
Improvement considerable,	5 "
(duration of disease 2 to 9½ years)	
Slight improvement	7 cases
(1 to 7 years' duration)	
Condition much the same	6 cases
(2 to 9 years' duration)	

1 patient alive at end of seven years ; condition not known.

WERNER.

The tumor removed from the orbit of a parrot and examined by Weeks (749) showed a structure very much like that of a sarcoma with round and spindle cells. In this there were many small yellowish masses in the centres of which were minute fibrillæ, the hyphæ of actinomyces and many granules. Radiating from those a multitude of club-shaped bodies were seen, the conidia of actinomyces. The growth returned in six weeks, and there was a tumor developed in the other orbit and also one on the leg. No other tumors were found on post-mortem. This is the first recorded case of this disease in birds. Burnett.

The patient from whom this specimen (750) was removed was a woman forty-five years old who first noted a protrusion of the right eye 12 years ago, which has slowly increased ever since. At time of examination V in R $\frac{2}{60}$, ocular movements good. A hard tumor felt in the upper portion of the orbital cavity. O. D. dull gray surrounded by a patch of choroidal atrophy. The tumor in its capsule was easily dissected from the tissues surrounding it. The tumor on examination showed itself to be a scirrhus carcinoma of the orbital part of the lachrymal gland. It was 1½ inches long and an inch thick, with a dense capsule. Some remnants of the lachrymal gland were still visible. Burnett.

Buller (751) dissected out a dermoid tumor from the upper-inner edge of the orbit and wounded the tendon of the oblique. After that he abandoned dissection and now simply evacuates the sac, washes it out well, and introduces a piece of nitrate of silver which dissolves and destroys the lining membrane. The result in the case was a perfect cure, with good motility of the eye.

Burnett.

Sattler's (752) case was that of a healthy young man of twenty-five who, three years before he applied for treatment, had noticed a hard nodular projection under the upper and inner margin of the orbit. The eye when seen was pushed forward, down, and outward. Vision good. There had been no pain or other symptoms pointing to involvement of the sinuses, yet when the mass was removed both the frontal and ethmoid cavities were found filled with a glairy mucus. The bony mass removed weighed 15.3 grams.

The case which Alt (753) reports was a woman of sixty-four who had symptoms of an intra-cranial tumor, whose eye symptoms were a right-sided facial paralysis, exophthalmos, myosis, and atrophy of the optic nerve quite far progressed on the right side.

The tumor was found, post mortem, to be basal and involved the origin of several of the cranial nerves. It had entered the orbit slightly through the sphenoidal fissure. On examination it proved to be a rare form of endothelioma. BURNETT.

PARK (754) reports a case in which he was not able after the most careful examination to find the least trace of an eyeball in the orbit of a child two weeks old. Eyelids adherent at margin leaving only $\frac{1}{8}$ of an inch open. Canaliculi absent also.

BURNETT.

XI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

755. COPPEZ. An attempt at a classification of grave infectious forms of conjunctivitis. *Ann. d'ocul.*, cxvii., p. 57.

756. MORAX. Subacute conjunctivitis. Clinical and bacteriological study. *Ibid.*, p. 5.

757. DE VOGEL. Bacilli of conjunctivitis. *Nederl. Oogh. Bydragen*, 3d Afl., p. 54, 1897.

758. AXENFELD. On chronic conjunctivitis caused by diplobacilli. *Centralbl. f. Bacteriol.*, xxi., p. 1.

759. BERNSTEIN. Blennorrhoic conjunctivitis of the newborn complicated with multiple arthritis. *Centralbl. f. prakt. Augenheilk.*, 1896, p. 84.

760. FEDOROW. The anatomy of follicular inflammation of the conjunctiva with reference to the normal structure of the latter. *Inaug. Dissert.*, Moscow, 1896.

761. SCHLEICH. The nature of spring catarrh. *Festschr. d Stuttgarter ærztl. Vereins*, 1897, p. 354.

762. DABNITZ. A case of spring catarrh and eczema of the skin. *Inaug. Dissert.*, Greifswald, 1897.

763. SCHIMMELPFENNIG. On a case of infantile conjunctival xerosis with kerato-malacia. *Graefe's Archiv*, xliii., 1., p. 41.

764. BRONNER. Tubercular growths of the conjunctiva. *Trans. Ophth. Soc. Un. K.*, xvi., p. 49.

765. GUNN. Acute bullous eruption with associated affection of the conjunctiva. *Ibid.*, p. 45.

766. BURNETT, SWAN M. Papilloid growth on the bulbar conjunctiva. *Amer. Journ. of Ophth.*, Apr., 1897.

767. NOYES. Pemphigus of the conjunctiva. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1897.

768. BOECKMANN, E. The operative treatment of pterygium. *Journ. Amer. Med. Assoc.*, Jan. 6, 1897.

769. HOTZ. Four cases of Thiersch's skin-grafting for pterygium. *Annals of Ophth.*, Jan., 1897.

Under the name "subacute conjunctivitis" MORAX (756) describes a frequent form of conjunctivitis that is caused by a specific diplo-bacillus. The disease is milder than the acute epidemic conjunctivitis caused by the Weeks bacillus, and resembles the conjunctivitis caused by the pneumococcus. The diplo-bacilli, which often assume the form of a chain, are distinguished from the pneumo-bacillus by the absence of a capsule and by a more typical bacillary form. The micro-organism is found both in the cells and free in the secretion. It does not stain by Gram's method. SULZER.

The infant of a mother with leucorrhœa was attacked on the fifth day, as BERNSTEIN (759) reports, with blennorrhœa neonatorum. Gonococci were found in great numbers in the secretion. Five days later the right wrist became inflamed, and then the right knee joint. The blennorrhœa and the affection of the joints lasted a month.

FEDOROW'S (760) conclusions are as follows: 1. The conjunctiva of the embryo and the new-born has no adenoid structure and contains no lymph follicles. 2. The conjunctiva of the adult contains diffuse and focal leucocytic infiltrations and also lymph follicles, which are to be considered physiological. 3. The normal conjunctival follicle develops from accumulation of cells (young tissue-elements, the appearance of retoblasts, the formation of a reticulum, further development of the cells). 4. The normal conjunctiva contains, among the tubular and acino-tubular glands, the follicular glands of Manz. 5. The mucous or goblet cells of the normal conjunctiva are found both on the surface and in the depressions of the membrane, even in the new-born; their development and function seem to be identical with those of the goblet cells of the intestinal epithelium. 6. A sharp distinction must be made between lymph follicles and simple accumulations of lymphoid cells. 7. The view that trachoma follicles arise from the leucocytes of an inflammatory infiltration, rests upon imperfect observation. 8. To consider the trachoma granule as a granuloma belies its anatomical structure. 9. All forms of follicular inflammation may be grouped into two classes: Inflammation with the formation of pseudo-follicles, and inflammation with true follicles. In the first class belong the folliculosis from spasm of accommodation and incorrigible hyperopia, atropine granulations, and some forms of subacute conjunctivitis.

In the second class belong follicular catarrh and trachoma, which are but different grades of the same affection. 10. Follicular catarrh as well as trachoma leaves scars. 11. Folliculosis of the conjunctiva is merely the becoming visible of the normally present follicles. 12. The trachoma follicle is identical in structure with the lymph follicle. 13. The passing of the trachoma follicle occurs through softening and absorption of its contents. 14. The softening of the trachoma follicle is an anæmia-necrosis of its cells. The entire course of trachoma formation and disappearance is complicated, at times, with an acute inflammation, which then preponderates. 15. Ulceration of the trachoma granulations is an inflammatory complication. 16. Anatomically, trachoma is a formation of lymph follicles in the conjunctiva leading to cicatricial degeneration. 17. Etiologically, trachoma is probably an independent disease. The superficial epithelial changes in the trachomatous conjunctiva are in intimate relation with the follicle formation in the subepithelial tissue, and consist chiefly in destruction of the epithelial cells from the immigration of leucocytes. 18. The replacing of the mucous-membrane epithelium of the conjunctiva by epidermoidal epithelium is a result of the cicatricial degeneration, and indicates a total destruction of the conjunctival tissue. HIRSCHMANN.

In many cases of spring catarrh SCHLEICH (761) was able to discover a disturbance of general nutrition which consisted in anæmia with swelling of the lymph glands and leucocytosis.

DABNITZ (762) observed a case of spring catarrh complicated with a chronic eczema of the skin which followed the course of the ocular affection, becoming exacerbated in the warm season of the year and diminishing in the winter.

In an infant eighteen days old, with diarrhœa, SCHIMMELPFENNIG (763) observed conjunctival xerosis with keratomalacia. A microscopic examination revealed a necrosis and fatty degeneration of the superficial layers of conjunctival epithelium and the same condition in all the layers of the corneal epithelium. Since many cocci were found these must be supposed to have caused the condition, but since no cocci were found in the vessels the infection was doubtless ectogenous.

BRONNER (764) records the case of a girl aged sixteen with tubercular disease of the nares. A red flat growth appeared on the conjunctiva of lower lid, which recovered after removal and scraping. It contained nodules with large giant cells but no caseation. There was never any ulceration. WERNER.

Gunn's (765) patient, a man aged twenty-five, had suffered three months before from a general bullous eruption with febrile symptoms. There were marginal cicatricial bands in the palpebral conjunctiva and ptosis of the left upper eyelid due to anchyloblepharon. During the bullous eruption a large vesicle was seen on the palpebral conjunctiva of the left eye, and one formed on the lower buccal mucous membrane. Werner.

Burnett (766) describes and figures a growth on the bulbar conjunctiva to the outer side and slightly above the corneal margin. It was about 1 *cm* in diameter. It consisted of a number of fine blood-vessels arranged radially around a central vessel. The ends of the vessels terminated in loops and on some a series of loops ran back towards the centre. It was removed by severing its pedicle. An examination showed it to consist of blood-vessels and epithelium mostly; the epithelium being squamous on the surface and becoming columnar as it approached the vessels at the deeper parts. Burnett.

The principal feature of interest in Noyes's (767) case of pemphigus of the conjunctiva—which was typical in its clinical characteristics—is the failure of all the operative means employed for the relief of the condition. He tried a flap of the conjunctiva moved over from the sounder parts to cover the denuded surface after separation of the ball and lid, a flap of skin taken from the arm, and a flap of skin with a pedicle taken from the temple. In every case adhesions reformed, and the condition was even rendered worse. The man was an Italian of forty-eight years.

Burnett.

The operation for pterygium put forth by Boeckmann (768) is what he calls reposition, in which the head of the growth is carefully dissected from the surface of the cornea and from the sclera to a short distance from the corneal border. The episcleral tissue over the space is now carefully dissected off, and the head of the pterygium which being loosened easily retracts outside the cornea, and is united to the conjunctiva with sutures. The theory of the operation is that the firm union between the head of the growth and the sclera will prevent its further encroachments on the cornea. Burnett.

Hotz (769) reports a number of cases in which he has filled in the space left after the excision of large pterygia by grafts from the skin behind the ear. He makes the graft a little smaller than the denuded space, in the horizontal direction. Both eyes are bandaged for 48 hours. In four reported cases there was but one failure. BURNETT.

770. RANVIER. The physiological rôle of leucocytes in wounds of the cornea. *Ann. d'ocul.*, cxvii., p. 194.

771. KOSOW. The treatment of purulent keratitis with eserine, and the prevention of corneal complications in blennorrhœa. *Wojenn. Med. Journ.*, Nov. 1, 1897.

772. GREEFF. Interstitial keratitis in its relation to general diseases. *Samml. zwangl. Abhd. a. d. Geb. d. Augenh.* Edited by Vossius, i., 8. 1897.

773. KLEIN, S. Keratitis hypotonica. *Ungarisch med. Presse*, Nov. 10, 1897.

774. RANVIER. On cicatrization and the rôle of the anterior epithelium of the cornea in the case of wounds of that membrane. *Acad. des Sciences*, Dec. 28, 1896.

775. SULZER. On the rôle of the cornea in the production of the differences existing between the corneal astigmatism measured by the aid of the ophthalmometer, and the total astigmatism. *Ann. d'ocul.*, cxviii., p. 123.

776. SCOTT, K. Keratitis occurring in leprosy. *Trans. Ophth. Soc. Un. K.*, xvi., p. 51.

777. FROST. Annular opacity of the cornea (with plate). *Ibid.*, p. 53.

778. BATTEN. Conical astigmatism, and staphyloma of the sclerotic as a cause of astigmatism. *Ophth. Rev.*, xvi., p. 1.

779. DUNN. A case of iritis with deposits in the cornea resulting in sclerosis and change of the normal surface of the cornea. *Annals of Ophth.*, Jan., 1897.

780. GREEN and EWING. Hypopyon-keratitis. Break in Descemet's membrane preceding corneal perforation. *Trans. Amer. Ophth. Soc.*, 1896.

RANVIER'S (770) interesting paper contains a detailed account of the cellular processes occurring in the healing of superficial wounds of the cornea.

According to GREEFF (772) interstitial keratitis attacks persons below the age of forty, females more frequently than males. It usually depends upon hereditary syphilis and occasionally upon acquired. Next to syphilis the most frequent cause is tuberculosis, and rheumatic influences also may bring it about. There is doubtless some connection between interstitial keratitis and malaria, diabetes, influenza, and affections of the female genital organs.

The affection termed keratitis hypotonica by Klein (773) has long been known and consists in a relatively slight infiltration of the cornea with marked irritation. The tension is greatly diminished. The cause of the decreased tension is a corneal fistula through which the aqueous humor trickles. With the closure of this opening, for which purpose Klein advises the use of the thermo-cautery, improvement is obtained and the condition is sometimes cured. Herrnheiser.

Ranvier (774) has made new experiments in regard to the regenerative processes in the corneal epithelium. When a rabbit's cornea is superficially incised, after 24 hours the margins of the wound are found to be gaping and the wedge-shaped defect filled with epithelial cells. Along the edges of the wound, the height of the epithelial layer is diminished one half. The middle layer, the layer of cubiodal cells, has more or less completely disappeared, and the cylindrical cells have grown broader though their height is less. These changes are not of an irritative nature. Immediately after the injury the cut margin of the epithelial layer is sharp. Four to six hours later a cellular process appears at each margin gradually pushing out until the defect is filled with epithelial cells of irregular shape and having large nuclei. These cells have the appearance of being over-nourished and this effect is probably attributable to the leucocytes which collect about the wound, their nuclei dividing, their protoplasm breaking down and nuclei being fully set free for the nutrition of other cells.

The epithelial cells filling the defect are such as have wandered from the epithelial layer at the margin of the incision. There is nothing to indicate that the filling of the defect comes about through the division of the cells. The process is merely one of immigration. Sulzer.

Scott's (776) first patient suffered from anæsthetic leprosy for three years. There was nearly complete facial paralysis, and inability to close the eyes. The lower two thirds of the corneæ were occupied by diffuse infiltrations, with groups of small papillæ, semi-transparent and solid-looking. Pericorneal injection moderate. In the second case, which was neglected, the whole cornea was similarly affected, and the conjunctiva was thickened, inflamed, and ulcerated. Werner.

In Frost's (777) case the condition dated from infancy. The circular opacity was almost central, the enclosed area being slightly hazy. WERNER.

BATTEN (778) records two cases, one of wound in the ciliary region, and the other due to scleritis, in which the shadows in retinoscopy were not parallel in one meridian but inclined to one another on the side where the sclerotic was weakened. He believes the distortion of the cornea may be often due to staphyloma of the sclerotic. WERNER.

DUNN's (779) case seems to be one similar to those reported by Kniess and some others, where the substance of the cornea was swollen from entrance of fluid through the membrane of Descemet, underwent changes, and caused limited and sharply outlined opacities. It began as a keratitis punctata in a syphilitic subject. In this case the form of the cornea was very much changed. BURNETT.

GREEN and EWING (780) give the histological pictures found in an eye enucleated for keratitis due to an exophthalmus and orbital tumor. These show that the hypopyon, which was a prominent feature in the clinical aspect of the case, was due, in this instance at least, to a break in Descemet's membrane and not as Leber has shown, in other instances, to a secretion of pus from the iris angle. BURNETT.

781. ROGMAN. Serous cyst of the sclera. *Ann. d'ocul.*, cxvii., p. 115.

True cysts of the sclera are very infrequent. To the small number already reported, ROGMAN (781) adds another. In a girl of thirteen, a tumor which appeared immediately after birth, had steadily grown larger. It was 8 *mm* long and 2-5 *mm* broad, resting on the sclera and adjoining the inner-lower quarter of the cornea. Puncture showed that the tumor was a cyst, containing a clear fluid and having no connection with the anterior chamber. The anterior wall of the cyst presented on its outer surface the epithelial covering of the conjunctiva, and just beneath it thick tracts of connective tissue and numerous elastic fibres. The deeper layers were formed of thin bundles of connective tissue.

Sections XII.–XXI. Reviewed by DR. P. SILEX.

XII.—IRIS.

782. GOLDZIEHER. Demonstration of a case of bilateral absence of iris, together with ectopia lentis and absolute glaucoma. *Ung. med. Presse*, 1897, No. 13.

783. Cargill, L. V. Gumma of the ciliary body. *Brit. Med. Journ.*, Jan. 2, 1897, p. 17.

784. Hignett, H. C. A case of gumma of the ciliary region. *Ibid.*, Nov., 1896, p. 380.

785. Eales and Sinclair. Uveal cyst of the iris. *Trans. Ophth. Soc. Un. K.*, xvi., p. 56.

Goldzieher (782) explains the glaucoma in his case of bilateral aniridia and ectopia of the lens by supposing that the lenses dislocated downward caused a disturbance in the lymph circulation, through pressure. Herrnheiser.

Cargill's (783) patient, æt. twenty-four, had a chancre ten months before the eye was seen. There was a dark red bulging of the sclera below and corresponding to it a reddish, yellow cauliflower-like growth in the anterior chamber. T — 2. V = p. l. The condition disappeared with mercurial treatment. Some discoloration of the sclerotic remained. Eyeball slightly shrunken in. Pupil excluded. A reference to literature of subject follows. Werner.

Hignett's (784) patient, a Malay æt. thirty, contracted syphilis two and a half years before the eye became affected. There were two reddish-purple bulgings of the sclerotic, opposite two reddish-yellow tumors in the anterior chamber. T+1. Ciliary tenderness. Recovered, with V= counting fingers, under mercurial treatment. Werner.

This (785) is an interesting case of cyst of the iris formed by detachment of the posterior layer of the uvea. According to the authors, this is the first case of the kind which has been diagnosed clinically. The condition was observed by Collins and recorded in vol. xiii., R. London Ophth. Hosp. Reports. The subject of this paper was a man æt. forty-seven, who frequently got lime into his eye. When seen, the eye was glaucomatous, steamy cornea. V = no p. l. Reaching from behind the iris into the pupillary area were two dark brown globular masses, freely mobile. Movements of the eyes producing in them a fine jelly-like tremble. Their surfaces were finely creased. Microscopic examination showed that they were formed by a splitting of the posterior uveal layer of the iris. There was also ectropion of the uvea, and detached retina. The angle of the anterior chamber was closed by peripheral adhesion of the iris. Werner.

XIII.—CHOROID.

786. Lagrange. A contribution to the study of metastatic ophthalmia not of microbic origin. *Arch. d'opht.*, xvii., No. 2, p. 94.

787. Darier and Rochon-Duvigneaud. A contribution to the differential diagnosis between true and false intraocular tumors. *Ibid.*, xvii., 3, p. 183.

788. Neese. Sarcoma choroideæ carcinomatosum seu alveolare melanoticum. *Graefe's Archiv*, xliii., p. 262.

789. Marshall, C. D. Detachment of the choroid. *Trans. Ophth. Soc. Un. K.*, xvi., p. 98.

790. Rockliffe, C., Leuco-sarcoma of the choroid. *Ibid.* p. 49.

791. Risley. Detachment of the choroid and retina by concussion. *Amer. Journ. of Ophth.*, Mar., 1897.

792. Lewis, G. G. A peculiar case of sarcoma of the choroid. *Annals of Ophth.*, Jan., 1897.

Lagrange's (786) patient was a child of two which, after suffering with fever, convulsions, hemiplegia, and swelling of the lower extremities, became blind in the right eye. The cornea and lens were clear, the pupil was dilated and irresponsive, and there was a white reflex from the virtreous chamber. A metastatic inflammation was suspected and the eye was enucleated. A white sero-albuminous exudation was found in the vitreous and also between the detached retina and the choroid and in the infra-choroidal space. There was also found mucoid degeneration of the retinal ganglion cells, of some connective-tissue cells in the choroid, and of the choroidal vascular endothelium. The vessels were normal, there were no accumulations of leucocytes, and no micro-organisms were found.

In the author's opinion this was a case of exudative chorio-retinitis not of parasitic origin, but caused by the toxic influence of a general disease. His case is, therefore, grouped with those described by Roth and Herrnheiser, which are called "septic" and not metastatic. v. Mittelstädt.

Darier and Rochon-Duvigneaud (787) report a case of tuberculosis of the eye which apparently began in the retina, then perforated the sclera and formed a tumor 1 *cm* in diameter at the sclero-corneal junction, and was mistaken by many for a leuco-sarcoma. The authors then proceed to state the distinguishing marks between intra-ocular tumors and the infectious neoplasms of syphilis and tuberculosis. In the former the changes remain localized to the immediate neighborhood of the tumor, inflammation is wanting, and only late do signs of glaucoma appear. In the pseudo-plasms, however, the neighboring regions are soon involved and the tension is lowered. v. MITTELSTÄDT.

NEESE (788) describes a case of sarcoma choroideæ carcinomatosum in a man of twenty-one, and gives a detailed account of the development of the opinions concerning this tumor, which Virchow classed with the carcinomas, but which Billroth and others later brought into the sarcoma group. The alveolar sarcomas are one of the most malignant forms.

MARSHALL (789) records three cases of choroidal detachment. The condition was discovered after excision. The first was due to choroidal hemorrhage after iridectomy for glaucoma. In the second there was fibrous thickening with cyst-like cavities. The third was a case of cataract extraction with subsequent leaking of the wound. The author thinks three factors necessary to cause the condition, viz.: Hyalitis with shrinking; choroido-retinitis leading to adhesions; and serous exudation between the choroid and sclerotic. The tension in choroidal detachment is always diminished. They are often lobulated.

WERNER.

The two interesting features of ROCKLIFFE'S (790) case are that the tumor was unpigmented and was seen in a very early stage. Patient, a man æt. forty-two, complained of defect in V for a month. $V = \frac{6}{36}$. No scotoma; normal fundus; reads slantingly. Two months later V = fingers at 2′; field defective above. Retina appears loose round *m. l.* In nine days detachment became very marked, extending down to periphery, with defined margin. A fortnight later the condition reached above the disc, and choroidal vessels became visible under the retina. The eye was excised, and the growth proved to be a round-celled leuco-sarcoma. The author refers to eight cases recorded in England. WERNER.

In the case reported by RISLEY (791) the trouble in the left eye began after a discharge of a gun close to the left side of the head, which deafened the patient and made him dizzy. The eye was not painful at the time. This was two years ago. At present the eye is softer than its fellow, and there is an evident

detachment of the retina conjoined with the choroid. V is totally lost.
BURNETT.

LEWIS (792) describes a case in which the eye had to be enucleated for glaucomatous symptoms, associated with hemorrhages, occurring at short intervals in the vitreous and also in the anterior chamber. A small tumor the size of a buck-shot was found at the posterior wall of the eyeball, apparently starting from the choroid, but extending through the scleral wall instead of towards the vitreous, as is common, and was visible on the outside a quarter of an inch to the nasal side of the optic nerve. An examination showed it to be a round-celled sarcoma.
BURNETT.

XIV.—GLAUCOMA.

793. SULZER. Glaucoma fulminans and permanent abolishment of the retinal circulation. Considerations on the rôle of intra-ocular circulation in the pathogenesis of glaucoma. *Ann. d'ocul.*, cxvii., p. 81.

794. CZERMAK. On the doctrine of the origin and course of the prodromes and acute attacks of glaucoma.

795. GAYET. The "sclero-iridectomy" of Professor Schoeler. *Zehender's klin. Monatsbl.*, xxxv., p. 31.

796. AYRES S. C. Acute glaucoma associated with large nasal polypus; removal of polypus and relief of glaucomatous symptoms. *Amer. Journ. of Ophth.*, April, 1897.

797. ALT. Hemorrhagic glaucoma. *Ibid.*

SULZER (793) believes that the vision suffers in glaucoma less from the direct mechanical action of the increased tension on the nerve elements than from a sluggishness of the blood circulation brought about by the increased tension. The form of the defect in the field corresponds to the idea of an insufficient nutrition of the retina. The anatomical changes found in acute glaucoma are those due to blood stasis. In acute glaucoma complete blindness comes on without excavation of the disc, and in other cases there is a complete excavation with fair acuteness of vision and a visual field but slightly contracted. The excavation of the disc is a secondary affair, due to the degeneration of the nerve fibres and to the disturbed nutrition of the tissues of the disc. The cause of all these nutritive disturbances is a slowing of the circulation which may be due to various causes. The disturbance of balance between intraocular pressure and arterial pressure is the most frequent cause of the outbreak of glaucoma in eyes predisposed to glaucoma by rigidity of the sclera and narrowing of the passages of exit. These cases may be designated as circulatory glaucoma. A second category is that in which the disturbance of circulation depends upon a primary change in the vessel wall (vascular glaucoma). Hemorrhagic glaucoma is the type of this group. Vascular glaucoma is characterized by the early and spontaneous appearance of hemorrhages in the anterior chamber, choroid, or retina. The third category, that of nervous glaucoma, consists in an affection of the vasomotor fibres of the eye. Glaucoma simplex is the most important variety. Operative interference is here likely to be followed by untoward results.

All varieties of glaucoma lead to vascular degeneration. This symptom is primary in vascular glaucoma and secondary in circulatory and nervous glaucoma. Therefore the forms are apt to be mixed, though the classification should depend upon the origin. SULZER.

CZERMAK (794) states that the flattening of the anterior chamber usually attributed to glaucoma really exists before the glaucoma, and predisposes to it. The flattening of the chamber he explains as being an excessive degree of the physiological flattening of old age, which is due to a diminished secretion of aqueous humor from the secretory parts which have undergone senile degenerative changes.

In cases of acute glaucoma there is no inflammatory adhesion between the iris and the ligamentum pectinatum, but they merely lie in apposition. The iris in these cases passes outward from its point of insertion and then bends sharply forward to lie on the ligamentum pectinatum. This condition is brought about, according to Czermak, as follows. In consequence of an excessive dilatation of the pupil when the chamber is shallow, the periphery of the iris becomes thickened until it touches the margin of Descemet's membrane. The aqueous humor then collecting forces the iris into the chamber angle. This dilatation of the pupil may be relieved naturally or by myotics, but if it remains it leads to a condition of irritation and increased tension; all the subsequent clinical signs and anatomical changes are the result of the increased tension and the consequent venous stasis.

v. MITTELSTÄDT.

GAYET (795) calls attention to the fact that as early as 1884 he recommended cutting through the sclera with shallow incisions in cases in which the posterior surface of the cornea was united with the iris.

AYRES's (796) patient was a man of fifty-five years, who had an attack of acute glaucoma in the right eye ; V = 0. 2. Eserine was ordered, but vision was reduced to 0.1. A polypus in the right nostril was removed to insure better breathing, and immediately the eye symptoms began to improve, and vision was in a short time advanced to 0.8. Several years have now elapsed and there is no return of the glaucomatous symptoms. BURNETT.

This case, which was seen from the first by ALT (797), is described in the fullest detail and seems to throw a great deal of light as to the manner in which hemorrhages in the retina bring about secondary glaucoma. The eye came to enucleation and was examined carefully in every part, an account of which it is impossible to give here in any detail. The general conclusions, however, which seem to be justified by a careful study of the case are that the disease is primarily one of thrombosis or thrombophlebitis of the larger venous blood-vessels, which leads to rupture of their walls and an effusion of blood. Some of this blood finds its way into the vitreous and is carried by the lymph current of the vitreous to the filtration angle at the base of the iris, causing a plugging up of this space and a consequent obstruction to the exosmosis. In case the eye is hypermetropic, as it was in the present instance, the filtration angle is small and easily obstructed, and then the condition of glaucoma is readily brought about. Where H. is not present or the conditions of obstruction of the filtration angle are not so favorable, retinal hemorrhages are not so likely to lead to secondary glaucoma. BURNETT.

XV.—SYMPATHETIC OPHTHALMIA.

798. FAGE. Sympathetic ophthalmia appearing a month after the enucleation of an injured eye. *Ann. d'ocul.*, cxvii., p. 186.

799. MULDER. Sympathetic papillitis. *Nederlandsche Oogheelkundige Bydragen*, Afl. 3, p. 38.

800. NUEL. On sympathetic amblyopia. *Arch. d'opht.*, xvii., p. 145.

A man of eighteen was blinded six years before by a bit of copper entering his right eye. Six months before, MULDER (799) found that the vision in the left eye was becoming poorer. The injured eye at this time showed perikeratic injection. L. V = $\frac{1}{4}$; papillitis, iris normal, vitreous clear. The injured eye was enucleated and the bit of copper found. No medicamentous treatment was employed. A month later the papillitis had disappeared and vision was normal. WESTHOFF.

NUEL (800) describes 16 cases of sympathetic amblyopia. In all except one, in which there had been a burn, a perforating injury had taken place, after which, often years later, amblyopia developed with partial atrophy of the nerve. The disturbance came on at a time when the injured eye was free from irritation, and even after an early enucleation had been done. The latter was of no avail when once the affection had appeared. The ophthalmoscopic picture consists in a woolliness of the disc and capillary hyperæmia. Finally there is temporal atrophy; pure atrophy was never observed. The prognosis, as compared with other sympathetic affections, is favorable. Treatment with gray ointment and rest is of value, but the effect of enucleation of the injured eye is doubtful. The origin of the affection is doubtful.

v. MITTELSTÄDT.

XVI.—LENS.

801. RANSCHENBACH. A contribution to the pathology and therapy of traumatic cataract. *Inaug. Dissert.*, Basle, 1897.

802. WETTENDORFER. A contribution to the etiology of juvenile total cataract. *Wiener med. Wochenschr.*, 1897, Nos. 11 and 12.

803. KREIWITZKI. On corneal astigmatism after iridectomy and simple linear extraction. *Inaug. Dissert.*, St. Petersburg, 1897.

804. TROUSSEAU. Treatment of hemorrhage after extraction of cataract by sclero-corneal suture. *Arch. d' opht.*, xvii., 2, p. 106.

805. MULDER. Posterior polar cataract and lenticonus. *Nederlandsche Oogheelkundige Bydragen*, Afl. 3, 41, 1897.

806. DEMICHERI. Interference rings in the cataractous lens. *Ann. d'ocul.*, cxii., p. 133.

807. DEMICHERI. *Ibid. Arch. d'opht.*, xvii., 1, p. 38.

808. SHUMWAY, E. A. Summary of operations for cataract done at the N. Y. Eye and Ear Infirmary from Oct., 1895, to Oct., 1896. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1897.

809. Oliver. Clinical history of a case of subconjunctival dislocation of the crystalline lens. *Ophth. Record*, June, 1897.

810. Wilson, F. M. Senile cataract. *Trans. Conn. Med. Soc.*, 1895.

811. Coover, D. H. An interesting but disastrous termination of a cataract operation. *Ophth. Record*, March, 1897.

Ranschenbach (801) records ninety-one cases of traumatic cataract seen in the Basle clinic. In the great majority of cases the cornea, and perhaps also the adjoining sclera or the iris, are perforated and the lens capsule is injured. The fate of the eye depends upon the infectious or aseptic nature of the penetrating body, upon the extent of the injury, and upon the parts involved. In the young, spontaneous absorption should be waited for. In general, operative procedures are to be postponed while inflammatory symptoms still exist, provided that there are no pressing indications for operation, such as the occurrence of glaucomatous attacks. The later the operation is done the better the course of healing, and the greater the percentage of cases recovering useful vision. In general, the prognosis is bad, the resulting acuteness of vision seldom being above $\frac{1}{10}$.

Wettendorfer (802) describes a case of severe idiopathic tetanus in a man of twenty followed by cortical punctate and linear opacities in both lenses. Two other cases of cataract following tetanus have been reported, both being of the zonular variety. In other spasmodic neuroses, such as epilepsy and the like, the occurrence of soft cataract is well known. The question whether the cataract stands in relation to the spasm of accommodation which occurs in tetanus, the convulsions of ergotism, and other general spasmodic conditions, is left open by the author.

The measurements were made with the Javal ophthalmometer. The final results, according to Kreiwitzki (803), are the same as those after peripheric extraction but of lesser degree. After iridectomy for glaucoma, the direction of the meridian of greater curvature is at times reversed, the refraction of the meridian in the direction of the coloboma being diminished. Hirschmann.

Trousseau (804) in two cases of intraocular hemorrhage after extraction put in a sclero-corneal suture. In the first case, the hemorrhage had persisted for some time. Nevertheless enucleation was rendered unnecessary and an atrophic ball was retained. In the second case, a severe hemorrhage appeared immediately after the eye was bandaged, and since the bandage did not check it, a suture was introduced which stopped the bleeding. An eye was preserved of natural size and form, and free from pain.

v. MITTELSTÄDT.

DEMICHERI (806) saw Newton's rings appear when an opaque lens reflected lamplight. In one case this interference phenomenon was observed in the capsule remaining in the anterior chamber after extraction. In order to explain these appearances, one must suppose an alteration in the superficial layers of the lens causing a change in refractive index. The lens capsule then acts like a thin plate of glass separating two media of different refractive index. SULZER.

DEMICHERI (807) observed in a cataract opaque to the capsule, the appearance of colored rings in the pupil. The centre appeared bluish-black, then followed green, yellow, and finally red. The yellow appears as a narrow line. The colored rings had not sharp outlines, but were undulatory and iridescent.

v. MITTELSTÄDT.

Of the 181 cases of cataract operations done at the N. Y. Eye and Ear Inf. (808) 128 were senile; 10 sclerosed lenses; 16 traumatic; 6 congenital; 7 soft; 14 complicated. Panophthalmitis occurred twice, and intra-ocular hemorrhage three times. Mental disturbance occurred in eight cases, there being a history of previous mental trouble in five. Simple extractions, 70%; with iridectomy, 21.67%; linear with needlings, 3.33%; through a previous coloboma of iris, 5%. Prolapse of iris occurred in 9.43%, on an average, 2.4 days after the operation. The average immediate recorded vision was $\frac{25}{100}$ +, the average ultimate vision $\frac{20}{50}$ —. Of ultimate vision, 0.1 in 2.85%; $\frac{1}{\infty}$ in 9.28%. In five cases no vision was looked for. BURNETT.

OLIVER'S (809) case was a woman of thirty-four years who fell and struck herself on the right eye. There was a rupture of the sclera in the upper ciliary region, in which the lens could be seen plainly to lie. Iris retracted and tremulous. The overlying conjunctiva was incised and the unincapsulated lens evacuated. The scleral wound was not disturbed. It was not found necessary to put any sutures in the conjunctival wound. Vision in due time came, with proper correcting glass, to near the normal.

BURNETT.

WILSON (810) reports 100 extractions of senile cataract. He is opposed to too strong antisepsis, considering it liable to lead to inflammation. Fifty-three cases were without iridectomy, with 5 prolapses of the iris; in 38 with iridectomy there were 3 prolapses of the iris, and 1 prolapse of the capsule. As to results; three failures and two with *p. l.* BURNETT.

COOVER (811) reports a case of extraction in a woman of seventy-seven suffering from diabetes, in which sloughing of the cornea began on the second day, and a few days after a thrombosis of the tracheal artery. She died at the end of a week.

BURNETT.

XVII.—VITREOUS.

812. BLASKOVICS. Prolapse of the entire contents of the eyeball after intra-ocular hemorrhage. *Szemészet*, 1896.

BLASKOVICS'S (812) patient, a woman who had suffered from glaucoma for ten years, had a severe hemorrhage from the left eye the day before her admission. It was probably a spontaneous retro-choroidal hemorrhage which, after extruding the lens and vitreous, inverted the retina and choroid and escaped through the pupil and the perforation of the outer coat.

XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

813. MODESTOW. Pathological changes in the retina from chronic nicotine poisoning. *Inaug. Dissert.*, St. Petersburg, 1897.

814. DOR. A case of persistence of binocular vision in a case of monocular amblyopia. *Rev. génér. d'opht.*, 1897, p. 51.

815. CABANNES and ULRY. Amblyopia following a fall on the head.

816. CHOCHRJAKOW. The pathological changes in the retina in acute uræmia. *Inaug. Dissert.*, St. Petersburg, 1897.

817. SILEX. Amblyopia and amaurosis in women before and after parturition. *Monatsschr. f. Geburtshilfe u. Gynækologie*, v., 4.

818. DUCLOS. Retinal hemorrhage in the course of leucæmia. *Ann. d'ocul.*, cxvii., p. 50.

819. MOSES. A contribution to the etiology of thrombosis of the central vein of the retina. *Inaug. Dissert.*, Würzburg, 1897.

820. COLLINS, E. TREACHER. Four cases of bilateral glioma of the retina cured by enucleation of the two eyes. *Trans. Ophth. Soc. Un. K.*, xvi., p. 142.

821. Lawford. A case of retinitis circinata (with plate). *Ibid.*, p. 87.

822. Hartridge. A case of retinitis circinata (with plate). *Ibid.*

823. Risley. Cyst of the right optic disc, choroiditis, and macular hemorrhage. *Trans. Amer. Ophth. Soc.*, 1896.

824. Oliver. A clinical study of a case of double chorioretinitis in the macular region following a flash of lightning, and a flash from burning lycopodium. *Ibid.*

825. Oliver. Ophthalmoscopic representation of a case of traumatic rupture of the inferior temporal vein of the right retina. *Ibid.*

826. Rogers, F. T. Report of a case of persistent retinal impression following the use of the sextant. *Ophth. Record*, April, 1897.

827. Keyser, P. D. On subjective visual sensations. *Ibid.*, May, 1897.

828. Cook, S. E. Unusual tortuosity of the retinal arteries. *Annals of Ophth.*, Apr., 1897.

829. Gradle. Occlusion of the arterioles supplying the macula lutea. *Ibid.*, Apr., 1897.

Modestow (813) poisoned rabbits with repeated injections of small amounts of nicotine dissolved in water. The retinas showed vacuole formation in the ganglion cells, dehiscence of the elements of the reticular and nuclear layers, detachment of the rod-and-cone layer from the limitans externa and of the pigment epithelium from the retina, and thickening and narrowing of the arteries. Hirschmann.

Dor (814) reports a very unusual case of monocular hysterical amblyopia with preservation of binocular vision. The nineteen-year-old patient accidentally noticed that the sight of the left eye was poor, but remembered that she had previously seen well with each eye. L V = 0.1 ; R V = 0.6. The power of accommodation is reduced in the left eye ; the visual field in this eye is scarcely contracted concentrically, but there is a relative central scotoma most marked for violet, blue, and yellow. The marked micropsia of this eye in connection with the peculiar central scotoma justified the diagnosis of hysterical amblyopia, although there were no characteristic stigmata. Cold-water treatment lessened the vision of the right eye without improving that of the left. R V = 0.2; L V = 0.1. The treatment of a stomach trouble and the use of the electric douche increased the vision to R V = 0.4; L V = 0.8. The central scotoma became less marked; but the field for blue suffered a concentric contraction. At this time the author noticed that the patient, when using the stereoscope, deciphered with the left eye test objects which could not be recognized when the right eye was closed. After stereoscopic exercises for a week the vision in each eye became normal, but binocular vision was impossible. She sees alternately with either eye, *i. e.*, the impression gained from one eye only is recognized.

SULZER.

CABANNES and ULRY (815) observed the following unusual case of traumatic amblyopia. A sailor of thirty-two fell on his head. Subluxation of the lower jaw. Bleeding from the nose, ecchymoses of the lids and conjunctiva of the left side. Loss of vision in the left eye for a week. Four weeks after the accident, the upper-outer portion of the field was wanting. The disc is somewhat pale. No accompanying symptoms except anæsthesia in the region of the infra-orbital nerve. SULZER.

CHOCHRJAKOW (816) ligated the ureters in a number of dogs and rabbits and killed some of them after the appearance of uræmic symptoms (second day), and some were allowed to die of uræmia (second to fourth day). In another series he removed the ligature and killed the animals at intervals, letting them live from a week to two months. The microscopic preparations of the retina were stained by the Ehrlich-Dogiel methylene-blue method. There were found general œdema of the retina, with vacuole formation in and about the ganglion cells, in the nuclear and reticular layers, in the varicose thickening of the nerve fibres and Müllers fibres, as well as swelling of the vascular endothelium and enlargement of the perivascular spaces. All these changes appeared in from 2 to 7 days and disappeared, after restoring the permeability of the ureters, within two months. Similar changes were found in the eyes of persons dead of uræmia. The author believes uræmic blindness with negative ophthalmoscopic findings to be due to the changes he describes in the retina.

HIRSCHMANN.

SILEX (817) divides the amaurosis in or following pregnancy into four groups. 1. Uræmic amaurosis without eclampsia. 2. Uræmic amaurosis with attacks of eclampsia, which may occur before, during, or after parturition. 3. Amaurosis without uræmia (reflex neurosis ?). 4. Amaurosis from various causes, such as convulsions of hysterical, epileptic, and apoplectic character. The amaurosis affects both eyes suddenly, and lasts minutes, hours, or days. It is mostly associated with eclampsia. The pupils are in some cases irresponsive, but they usually react to light even in complete amaurosis. The fundus always presents a normal ophthalmoscopic picture. The prognosis is generally good, and when vision does not soon return to the normal, a complicating retinitis may be suspected.

MOSES (819), after speaking of the formation of vessel thromboses in general, records 50 cases of venous thrombosis and comes to the conclusion that it always occurs in individuals who exhibit some disturbance in circulation due to atheromatous or syphilitic thickening of the vessel walls, cardiac weakness, or general diseases such as anæmia and diabetes,—that is, it occurs in marantic persons. Spontaneous thrombosis of the central vein of the retina belongs to this group of marantic thromboses.

In a paper on glioma in the *Royal London Ophthalm. Hospital Reports*, the author (820) came to the conclusion that 3 years after the operation the fear of recurrence was practically nil. In these 4 cases more than 3 years had elapsed since the excision of the second eye. It is for the parents to decide whether they consider life worth saving on the condition of loss of sight. One eye only should be removed at a time and subjected to microscopic examination to exclude all doubts. In one case the eye although shrunken contained a gliomatous growth.

WERNER.

LAWFORD'S (821) case is a typical one occurring in a woman æt. seventy-seven. There were retinal hemorrhages at the macula in one eye, with one irregular white exudation. The other eye presented the typical appearances. Mr. Doyne had noticed peculiar "globes" with bright reflex on their surface in a case (plate vi. illustrates his case). WERNER.

HARTRIDGE'S (822) patient was a woman æt. sixty-one. The appearances were somewhat similar to those of albuminuric retinitis, but no albumen was ever detected in the urine. It was probably an early stage of retinitis circinata. (The circle formed by the white streaks, as seen in plate, is larger than is usually observed in albuminuric retinitis.—L. W.)

WERNER.

Risley (823) gives a colored drawing of a small cyst on the upper edge of the optic disc projecting 2 *mm.* into the vitreous. Below this there is the remains of a hyaloid artery.

Burnett.

This case of Oliver's (824), whose history is so freely given, and illustrated by drawings, was in a young man twenty years old who had a central scotoma of both eyes, following a vivid flash of lightning and some little time after by a flash of burning lycopodium. The changes in the form of the scotoma are given in a large number of drawings by the patient, who is an artist. Ophthalmoscopically the macular region seemed slightly puffed with an irregularly flattened mass. The tissue itself did not seem to be discolored or opaque. There were no hemorrhages. The left retina was but little changed. The final outcome after many months was $\frac{2}{3}$ vision in R and V = 1 in left. Burnett.

Oliver (825) gives a fine chromo-lithographic picture of a rupture of the inferior temporal vein of the retina as the result of a blow on the eye from a steel projectile thrown with only moderate force against it. The hemorrhage was sub-hyaloid. There was a delicate stellate opacity at the macula. Ultimately good vision was restored. Burnett.

In Rogers's (826) case of persistent retinal impression following looking at the sun through the sextant there was observed ophthalmoscopically an unusual redness of the choroid and retina around the macula, which was not seen in the other eye. The first subjective symptoms were semicircles of light revolving around a dark centre that afterwards changed to a pentagon, with correction of ametropia, V = 0.5. These conditions have remained essentially the same for several months. Burnett.

Keyser (827) relates three cases of hemianopsia which were brought about by the ingestion of honey as an article of diet. Every time honey was indulged in the phenomenon of half-vision presented itself ; recovery of V, however, in the course of some hours, after sleep. Burnett.

Cook (828) records the history and illustrates with a good drawing a case of very marked tortuosity of all the retinal arteries, the veins being of normal size and course. The eye was healthy and had normal vision. Burnett.

Gradle's (829) patient was a man of twenty-five years who had several spells of temporary blindness in the right eye (the left was aphakic from an accident), and finally had one which was permanent. Gradle found a central dark spot in the V F, 5° up and down and 6° laterally from the point of fixation. The fovea showed a dark cherry spot, and the retina from there to the disc was hazy. The rest of the retina and its vessels were normal. All these appearances gradually faded away, and at the end of a year there was only a slight pallor on the temporal part of the papilla. There was, however, a slight narrowness of the arteries, and there was a white streak along the side of one of the veins. Central vision was about $\frac{20}{200}$. No heart lesion. BURNETT.

XIX.—OPTIC NERVE.

830. WIDMARK. The location of the papillo-macular bundle. *Nordish med. Arkiv*, Jubilee volume, No. 25, 1897.

831. SPICER, W. T. Chronic retrobulbar optic neuritis, with permanent change in nerve, set up by tobacco. *Trans. Ophth. Soc. Un. K.*, xvi., p. 131.

832. WALKER, H. S. Tumor of optic nerve. *Ibid.*, p. 131.

833. OGILVIE, F. M. Optic atrophy in three brothers. *Ibid.*, p. 111.

834. BATTEN, R. D. A family suffering from hereditary optic atrophy. *Ibid.*, p. 125.

835. SPICER, W. T. Spurious optic neuritis. *Ibid.*, p. 134.

WIDMARK'S (830) patient was a laborer of fifty-four whose sight had failed two months before, and who had used alcohol and tobacco to excess for years. R V = 0.2; L V = 0.1, with a central scotoma for red, and later a smaller absolute scotoma. Five weeks' hospital treatment brought about no improvement. Three weeks later he fell from the third story of a building, dying with a fractured skull.

Microscopic examination of the nerves and tracts revealed a degeneration of the papillo-macular bundle whose location in the nerve and chiasm corresponded closely to that found in previous investigations. In the tract the bundle first lay upward and inward, but before the tract reached the peduncle the upper part of the bundle turned outward, and lay upward and outward in the tract. The degeneration was especially marked in and immediately in front of the optic canal and gradually decreased as one passed upward or downward. SCHIÖTZ.

SPICER (831) has apparently excluded all causes except tobacco in this case. The only remarkable thing in the history is the mortality of his children, fourteen of whom died out of twenty. He never completely gave up tobacco. WERNER.

WALKER'S (832) patient, a boy aged eight, noticed proptosis for nine months previous ; the eye was displaced forwards and slightly downwards. Vertical movements lost, lateral slight. No *p. l.*, optic neuritis. The tumor was a glio-sarcoma, and was included in the sheath of the nerve. WERNER.

In OGILVIE'S (833) cases vision failed suddenly in one and gradually in two. Ages, twenty-four, twenty-two, and twenty-seven. All temperate smokers. No syphilis. In one case headaches accompanied failure of V., and in another bilious headaches occurred from childhood. Amblyopia equal in both eyes. Optic discs became pale first at outer side. Retinal vessels tortuous. Visual fields contracted, with central scotoma, and color V. defective. A complete family history is given, showing a great mortality in early life. Tortuous retinal vessels were present in nearly all examined. WERNER.

In BATTEN'S (834) cases, the mother's sight began to fail at twelve years of age. Her son, aged twelve, had slight neuritis ; a daughter aged ten had distinct atrophy. No evidence of nervous or other diseases. WERNER.

SPICER'S (835) patient, a boy aged eleven and one-half, presented appearances of optic neuritis, with $V = \frac{6}{6}$. No change while under observation during three years. WERNER.

XX.—INJURIES, FOREIGN BODIES (PARASITES).

836. SZILI. Various eye injuries. Demonstration of two cases of magnet operation. *Ung. med. Presse*, 1897, No. 9.

837. SOUS. Pseudo-melanosis of the eye. *Soc. de méd. et de chir. de Bordeaux*, Jan. 1897. *Ann. d'ocul.*, cxvii, p. 137.

838. NATHANSON. On the injurious effect of hairy caterpillars on men and animals, particularly as regards the eyes. *Wratsch*, 1897, No. 8.

839. CLARK, C. F. A question as to the presence and location of a minute fragment of steel in the eye determined by the Roentgen rays. Successful removal by the electro-magnet. *Trans. Amer. Ophth. Soc.*, 1896.

840. FRIDENBERG, PERCY. The localization of foreign bodies in the eye by means of the X-ray. *Med. Record*, May 15, 1897.

841. OLIVER. Clinical notes of a case of injury producing as

the most prominent symptom luxation of the eyeball into the orbit (so-called traumatic enophthalmus). *Ophth. Record*, Jan., 1897.

842. De Schweinitz. A piece of steel in the ciliary body located by means of Roentgen X-rays. *Amer. Journ. of Med. Sciences*, May, 1897.

843. Kollock. Four cases of successful removal of foreign bodies from the eye. *Annals of Ophth.*, Jan., 1897.

844. Stirling, J. W. Tumor of the meninges in the region of the pituitary body pressing on the chiasma. *Ibid.*

Among the patients presented by Szili (836) one was of particular interest. A boy of fourteen was injured by a splinter of copper being driven into his eye by an explosion. Although this foreign body remained there for two years, the eye was not wholly destroyed, but there developed in it a cyst of the iris, in which the bit of copper was enclosed. The cyst was excised and the copper removed. The tension of the eye was somewhat diminished, but projection and light perception were good.

Herrnheiser.

Nathanson's (838) patient was a girl, into whose eye a brown caterpillar had been thrown. On the third day there was marked irritation of the eye and a defect in the corneal epithelium, which healed in a few days. Then small vessels and infiltrations appeared repeatedly in the cornea, lasting each time two or three days, and being accompanied by striped opacities deep in the cornea. Small nodules also appeared in the conjunctiva, lasting for two or three weeks and then passing away, to be followed by the formation of other nodules. The eye regained its original vision.

Hirschmann.

Clark (839) reports a case of supposed foreign body in the eye, whose presence and location were determined by means of the skiagraph, and, following these indications, a piece of steel, 1 *mm* square, was removed by means of the electro-magnet from the anterior chamber. It was apparently in the iris.

Burnett.

The method for skiagraphy of the eye for the purpose of detecting the presence and place of a foreign body employed by Fridenberg (840) is to take the views of the eye and orbit at right angles to each other, for the purpose of combination. In one, the closest possible approximation to the eye is effected by having the two plates bandaged to the eye. The shadows thrown by the bones of the skull are eliminated as much as possible by extreme over-exposure. When two pictures are not possible, the profile picture may be dispensed with and the position of the foreign body computed by the known factors of the diameter of the body itself, that of the shadow picture and the distance of the tube from the plate. BURNETT.

In OLIVER'S (841) case a man of forty-seven was struck by a shuttle on the left eye, five weeks before. When seen he had a retrocession of that eye into the orbit of 4 or 5 *mm* behind its fellow. The pupil was larger than that of its fellow, but the accommodation was good. Palpebral fissure 3 *mm* shorter than on the other side ; complete paralysis of sup. rectus and slight paresis of inf. oblique. Vision after correction of H. was $\frac{1}{7}$ of the normal. No fracture of the orbital bones was made out. BURNETT.

The interesting feature about DE SCHWEINITZ'S (842) case, aside from the fact that the piece of metal was located by an X-ray picture made by Dr. Stern, is the fact that after numerous attempts had been made to extract the body (which was not visible) by means of the magnet, it was finally removed by the magnet under the guidance of the picture, and the eyeball saved with vision of $\frac{6}{12}$. The piece of metal was 4 *mm* long, 2 *mm* wide, and weighed $\frac{7}{16}$ grain. The visual feld was somewhat narrowed concentrically. BURNETT.

The first of KOLLOCK'S (843) cases was a bit of steel in the vitreous entering behind the ciliary body. It was successfully extracted by a magnet and perfect vision maintained. The second was a bit of steel in the iris, infringing on the lens. It was removed by a magnet and no permanent injury of the lens followed. The third was a bit of steel embedded in the iris and projecting into the anterior chamber. In making attempts to extract it, it fell into the anterior chamber, from the bottom of which it was successfully removed, though it was full of blood. In the fourth case the foreign body was in the lens, and, some years after its entrance, was removed with the lens, which had become opaque. BURNETT.

STIRLING (844) reports the case of total blindness in the left and complete right hemianopsia of the right eye, in a man of forty-two, coming on slowly. There was atrophy of both sides. Other general symptoms pointed to a lesion near the pituitary body, and on post-mortem examination it was found in the form of an endothelioma growing from the meninges and pressing on the front of the chiasma. BURNETT.

XXI.—OCULAR AFFECTIONS IN GENERAL DISEASES.

845. WAGENMANN. Remarks on eye affections in gout. *Graefe's Archiv*, xliii., p. 82.

846. GOH. On the eye changes in general septic diseases. Retinitis septica, benign metastatic inflammation, bilateral marantic thrombosis. *Ibid.*, p. 148.

847. JOELSON. On the eye changes in acromegaly. *Wjest. Ophth.*, 1897.

848. STRZEMINSKI. Ocular complications of diseases of the liver. *Rec. d'opht.*, 1897, p. 49.

849. DOLGANOFF. Eye changes following ligation of the gall-bladder. *Arch. f. Augenheilk.*, xxxiv., 3, p. 196.

850. GALEZOWSKI. On ocular scrofula and its relations to hereditary syphilis. *Rec. d'opht.*, 1897, p. 113.

851. STRZEMINSKI. Syphilitic disease of the eye in the second generation. *Gazeta lekarska*, Nov. 23, 1896.

852. DEMICHERI. A case of cerebral syphilis with ocular complications. *Ann. d'ocul.*, cxvii., p. 104.

853. KUDISCH. A case of hemorrhage from the eye of a newborn child. *Südruss. med. Zeitung*, 1896, No. 50.

854. OBERSTEINER. The central visual apparatus in its diagnostic relations. *Wien. med. Presse*, 1897, No. 7.

855. SIEMERLING and BOEDEKER. Chronic progressive ocular-muscle paralysis and progressive paralysis. *Arch. f. Psychiatrie*, xxix., 2.

856. OLIVER. A brief study of the ophthalmic conditions in a case of cerebellar tumor; autopsy. *Trans. Am. Opht. Soc.*, 1896.

857. DE SCHWEINITZ. Histological examination of the eyes from a case of pernicious anæmia. *Ibid.*

858. GRUENING. On mild types of quinine amaurosis without pallor of the optic discs. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1897.

859. DE SCHWEINITZ. Tobacco amblyopia in a woman with anomalous scotomas. *Opht. Record*, March, 1897.

860. HARLAN, HERBERT. A case of amblyopia from a large dose of quin. sulph. *Ibid.*

861. MARLOW. Note on the use and non-use of the occlusive bandage in cases of heterophoria. *Ibid.*

862. WOOD, CASEY A. A case of lead poisoning, presenting some unusual eye symptoms. *Med. News*, May 29, 1897.

863. STEVENS. The clinoscope. *Med. Record*, Feb. 27, 1897.

864. BULL. The ocular complications of typhoid fever. *Ibid.*, April, 1897.

865. BRUNS. Case of quinine amaurosis; observations extending over ten years. *Am. Jour. of Opht.*, Jan., 1897.

866. CULBERTSON. Report of two cases of scopolamine poisoning. *Ibid.*, March, 1897.

WAGENMANN (845) states that gout as a cause of eye disease has received but little attention in Germany. He reports some cases, and speaks of recurrent chalazion, sclerosing keratitis, marginal keratitis, episcleritis periodica fugax, recurrent opacities of the vitreous of hemorrhagic character, and glaucoma, although the last is very rarely caused by gout.

GOH (846) distinguishes septic retinitis from metastatic retinochoroiditis. The former, in which inflammatory signs are wanting, is the expression of a general changed condition of the blood. Toxic matters lead to affections of the blood-vessels. In rarer cases marantic thrombosis in the retina and choroid may be a cause of hemorrhages.

When septic micro-organisms collect in the eye, inflammation always follows, usually of a purulent variety.

JOELSON (847) observed a case of acromegaly in a man of thirty-six. The osseous changes were more marked on the right side than on the left. The ocular conditions were as follows: Exophthalmus R; the lids of both eyes relaxed and œdematous; R pupil enlarged, both pupils respond to light sluggishly; R counts fingers at five feet, L, $V = \frac{20}{40}$. Peripheric vision reduced. R disc pale in the centre, the temporal halves of both discs pale and atrophic. The exophthalmus and the atrophy of the optic nerves were thought to depend upon the thickening of the bone.

HIRSCHMANN.

STRZEMINSKI (848) collects the cases that have been reported of eye affections due to diseases of the liver, and adds the following observations:

1. Optic neuritis with concentric contraction of the field in cirrhosis of the liver. The patient was a laborer of forty-four, addicted to the use of alcohol.

2. Hemeralopia and œdema of the discs during a catarrhal icterus. The ocular disturbances ceased when the hepatic affection was cured. The patient was a woman of twenty-three.

3. Marked hyphæmia in a laborer of twenty who suffered from hypertrophic cirrhosis of the liver. SULZER.

STRZEMINSKI (851) treated two children whose parents had not suffered from acquired syphilis, but whose father, at the age of sixteen, had bilateral parenchymatous keratitis, and now shows areolar choroiditis. One child, a boy of twelve, had a bilateral parenchymatous keratitis, followed by areolar choroiditis and opacity of the vitreous. The other child, a girl of nine, lost the sight entirely from opacity of the vitreous, which cleared up under mercurial treatment when a pigmentary choroiditis, similar to retinitis pigmentosa, was discovered. HIRSCHMANN.

KUDISCH'S (853) patient was delivered prematurely from a mother suspected of having syphilis, and Crede's nitrate of silver solution had been instilled into the eyes. The following day there was a discharge of blood, without pus, from the conjunctiva of the eyes, which were otherwise healthy. Treatment with bandages, cold applications, etc., was of no avail. On the fourth day an eruption appeared on the body, the soles, and the palms, supposed to be syphilitic. The frenulum of the tongue was cut, as the movements of the tongue were restricted. This operation was followed by an uncontrollable hemorrhage, which caused death on the seventh day. The author regards this as a case of hemorrhagic hereditary syphilis. HIRSCHMANN.

OBERSTEINER (854), in his paper, gives a condensed description of the portions of the brain concerned in vision, and of their functions. He regards the retina and optic nerve, not as a peripheral sense organ, but as a central one, since section of the optic nerve is not followed by recovery, as in the case of peripheral nerves. He speaks then of the anatomical course of the visual apparatus in the chiasm, tract, etc., and places the cortical visual apparatus in the calcarine fissure of the occipital lobe. The physiological conception of this region, that the optical memory images lie in the cortical cells in the region of the visual centre, is not adopted by Obersteiner; other reasons apart, cases have been observed in which both occipital lobes were destroyed, while the perception of visual images remained. As to the function of the visual sphere, the author does not agree with those who assume the existence of separate regions for the perception of light, color, and form. Color- and light-sense perception are located at the same point, while the conception of form is a more complex psychical process, which in Sachs's opinion arises from the representation of motion through the innervation of the ocular muscles.

In speaking of the pathological changes in the visual tract, he dwells on bilateral cortical hemianopsia, in which central vision is preserved, showing that some small region has escaped destruction. In bilateral destruction of the occipital lobe, the patient loses also the faculty of orientation. This also occurs with unilateral disease, so that the author believes that with the destruction of this part are also affected the association fibres running to other regions.

OLIVER'S (856) case was a man of thirty-eight, who had the usual symptoms of brain tumor, with choked discs. The peculiarities of the ocular symptoms were the high degree of neuritis; almost absolute blindness in the right, with a small, oblong, central remnant in the left. Nearly total interior ophthalmoplegia, most marked on the right side, and horizontal nystagmatic movements. All these, he thinks, indicate more precisely the origin of the growth, which was from the under and external surface of the middle cerebellar peduncle, projecting outwardly between the pons, medulla, and right cerebellar lobe. BURNETT.

The histological characteristics found by DE SCHWEINITZ (857) post mortem, in a case of pernicious anæmia were, as to the eyes: (1) hemorrhages into the various strata of the retina, but most marked in the nerve-fibre layer; (2) varicose hypertrophy of the fibres of the optic-fibre layer, either as an isolated lesion or gathered in a conglomorate mass; (3) exquisite œdema of the retina, especially marked at the periphery, beginning in the outer reticular layer and gradually involving the outer granular layer, and converting the space between the internal granular layer and outer limiting membrane into a series of oval cavities.

BURNETT.

GRUENING (858) here reports two cases of mild quinine amaurosis with typical contraction of the visual fields, not attended with pallor of the optic discs as is usually the case, but, on the contrary, with a rather over-full condition of the vessels.

In these cases, central vision was but little reduced. One was a woman of fifty, the other a man of seventy-three.

BURNETT.

DE SCHWEINITZ'S (859) case was a woman of sixty, who had characteristic tobacco amblyopia, with central scotoma for green and red—beginning 5° to the temporal side of the fixing point, and passing to 20° on the horizontal and 15° above and below at the base of this triangular spot. There was no reason to suppose that *alcohol* played any part in the intoxication. She smoked probably more than six cigars a day. Vision in left has always been defective. Under strychnia and iodide of potassium and stoppage of tobacco, a perfect recovery was obtained for the right eye. BURNETT.

In HARLAN'S (860) case a man took 200 grains of quinine sulph. Some 4 days after, the patient was totally blind. Pupils widely dilated, nerves white, and retinal vessels reduced to the merest threads. Under strychnia he improved so that V in R $\frac{15}{20}$ L $\frac{15}{24}$, but only for a very limited field, which however gradually widened to 35° or 40° laterally from the point of fixation and 20° to 25° vertically. BURNETT.

MARLOW (861) recommends the use of an occlusion bandage on one eye as a good means of developing any latent heterophoria, but condemns the bandage after operation on the muscles. The operated eye being free and able to participate in binocular vision goes far to securing a proper place of re-union of tendon to the ball. BURNETT.

The unusual features about WOOD'S (862) case of lead poisoning is the unilateral (left) paralysis of the third nerve, and a slight papillitis of both nerves with contraction (concentric) of both fields. There were no other symptoms of lead poisoning present at that time, though the man had bad attacks of colic previously, and had been a painter for sixteen years.

BURNETT.

STEVENS (863) describes an instrument for the purpose of testing the declination of the vertical meridians of the retina. It consists of two parallel tubes so arranged that they can be rotated on the horizontal axis or raised or depressed separately. At the distal ends are inserted the figures which serve as test objects, viewed from the proximal end, for the determination of the extent of such declination, and the amount of such variation can be read off on a scale fixed on the outside of the tubes. BURNETT.

Bull (864) enumerates the diseases of the eye which are liable to be met with in typhoid fever in the following order of frequency : Conjunctivitis. Phlyctenular conjunctivitis and keratitis. Loss of accommodation and dilatation. Retinal hemorrhages. Paralysis of external muscles. Neuro-retinitis, or retro-bulbar neuritis. Inflammation of the uveal tract. Burnett.

The principal feature of interest in the case of quinine amaurosis reported by Bruns (865) is the condition ten years after the occurrence. The nerves are blanched bluish-white, and vessels very tenuous, and yet in a good light $V = \frac{20}{20}$, and No. 1 can be read. V F F. not narrowed so much as to cause any inconvenience. They were not taken accurately. Color perception for red and green good. Burnett.

Culbertson (866) reports two cases of toxic effects from scopolamine drops of a strength of one fourth of one per cent. Two drops put in in the course of an hour in one, eight drops during the same time in another, produced this effect. Burnett.

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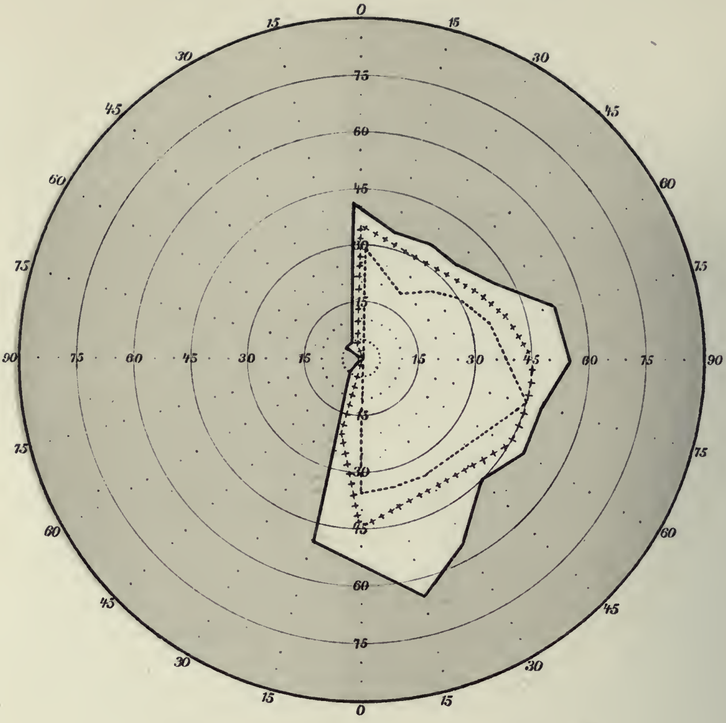

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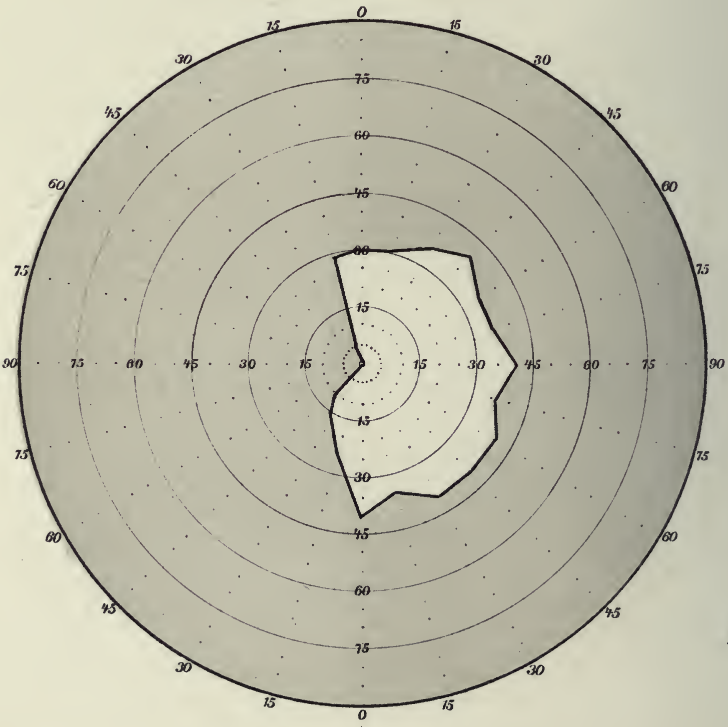

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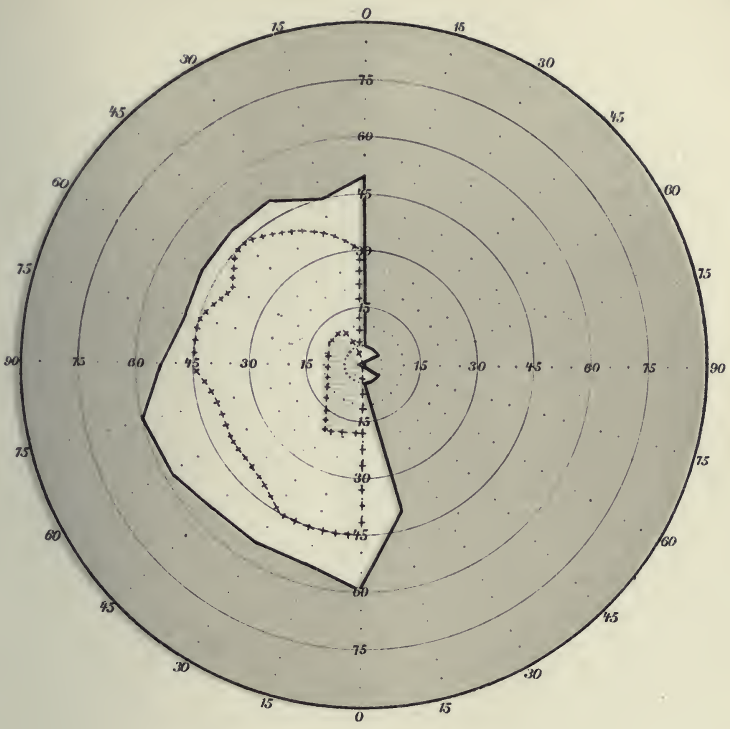

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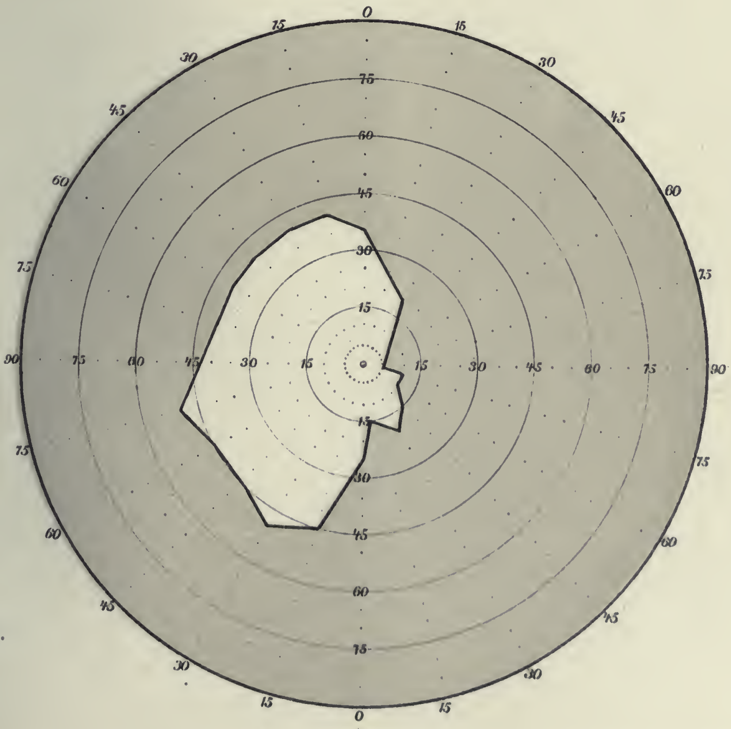

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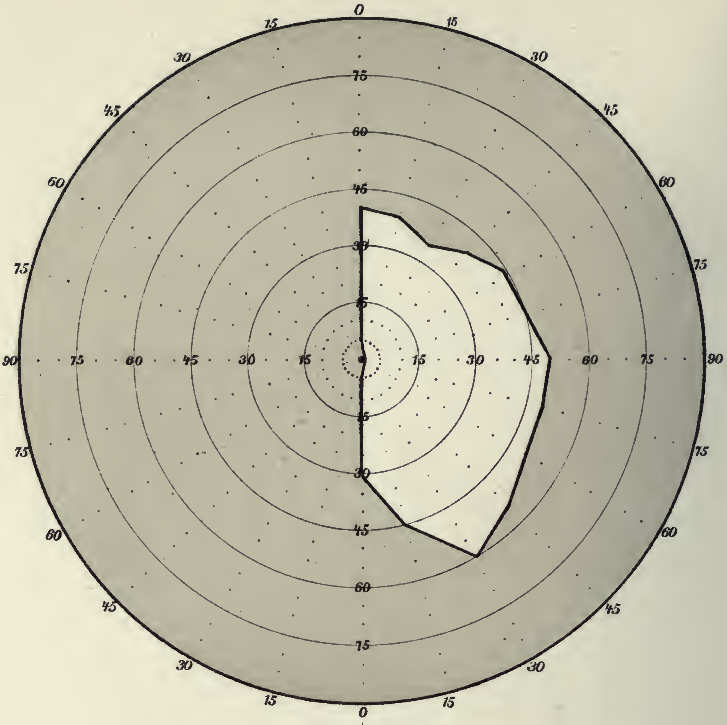

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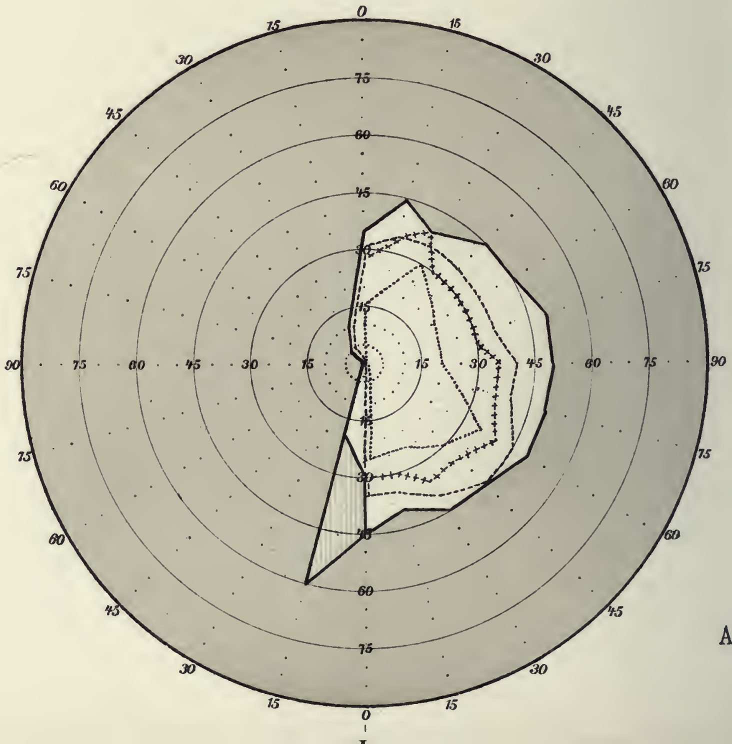

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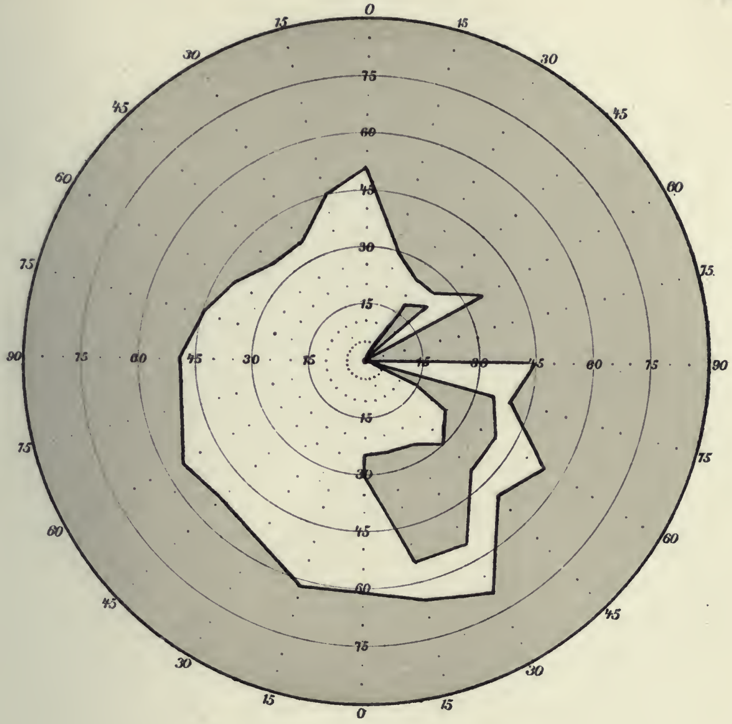

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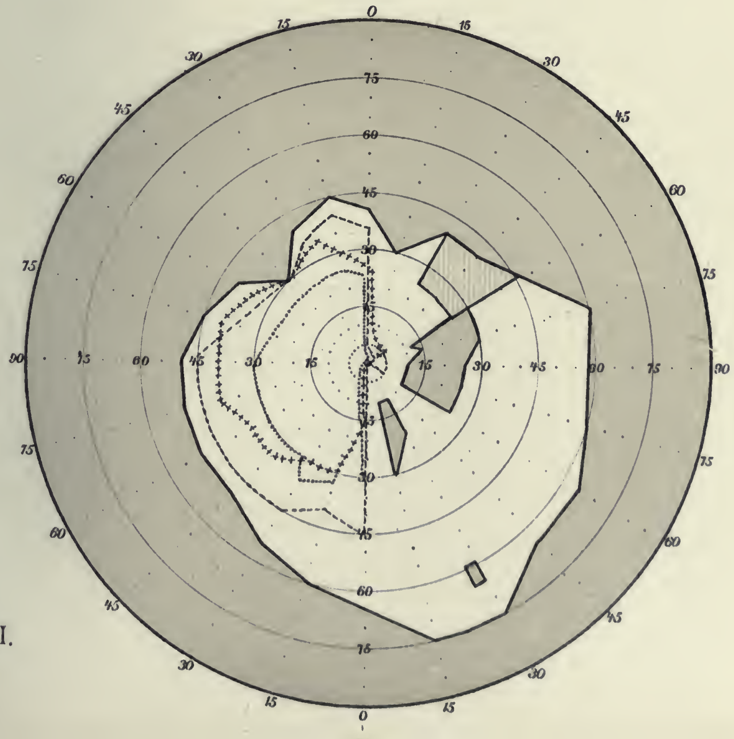

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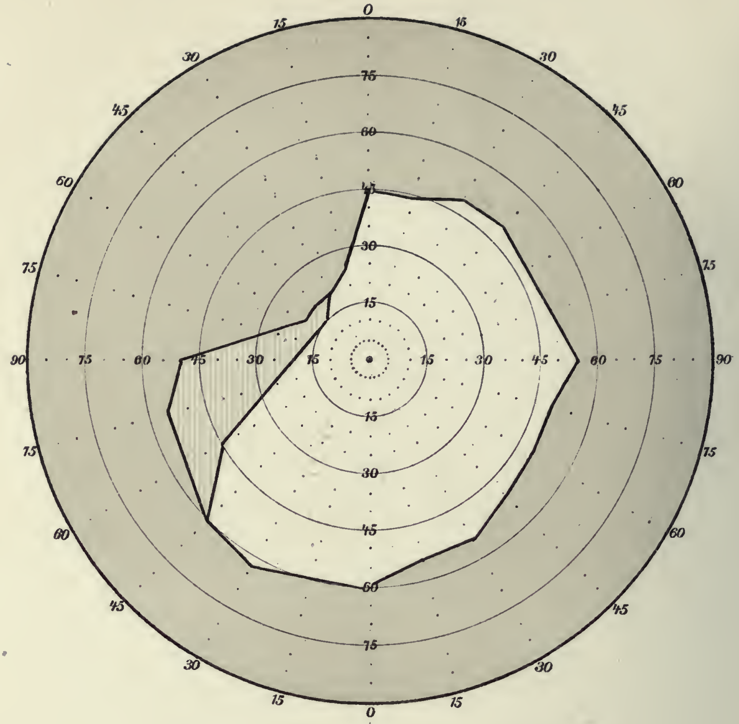

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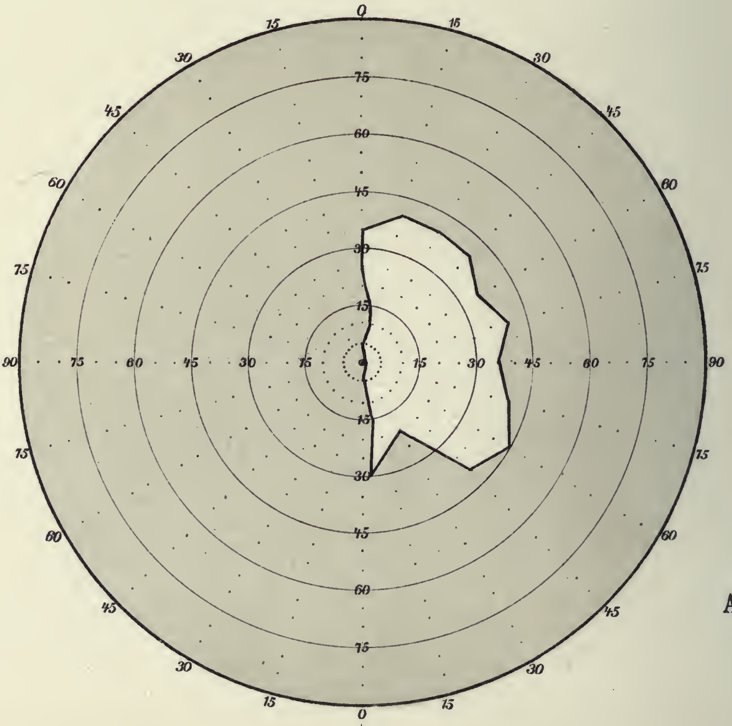

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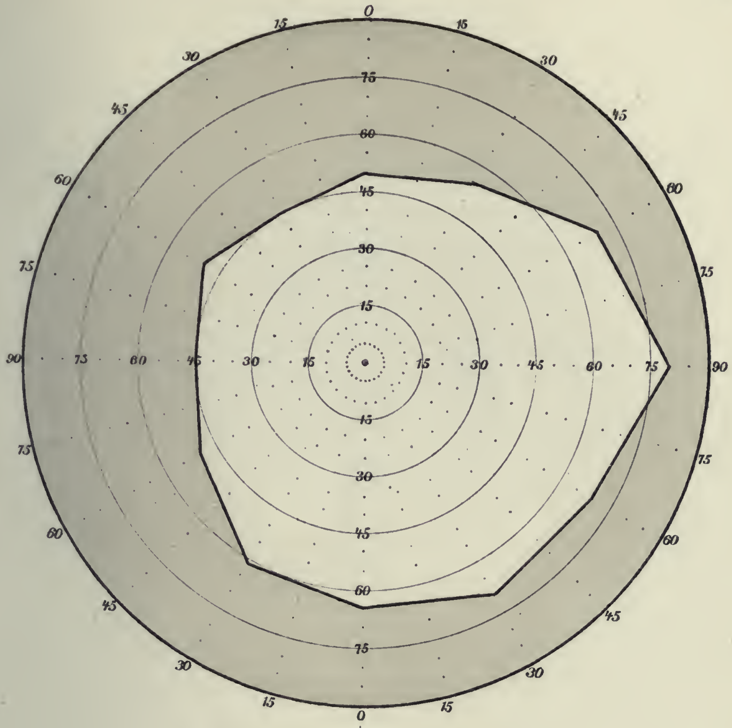

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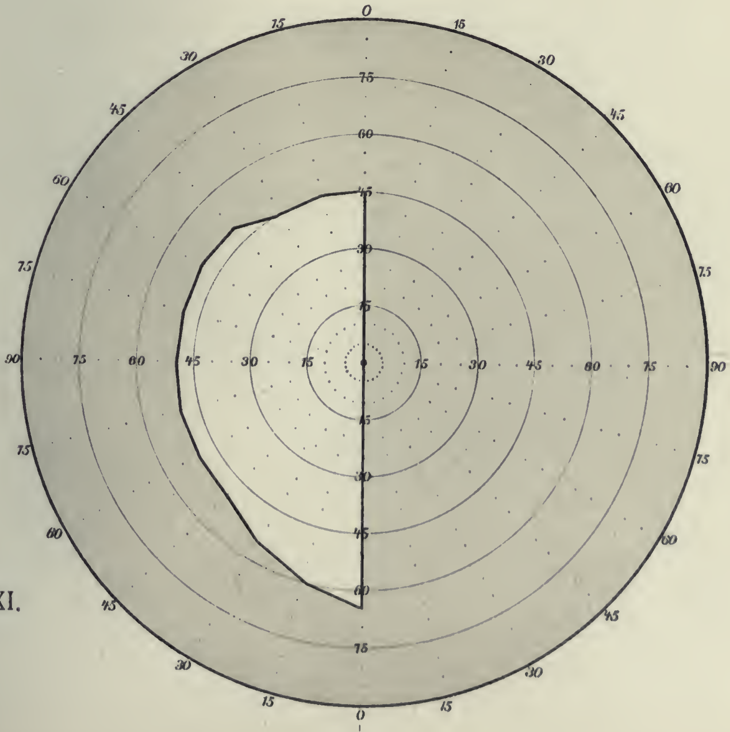

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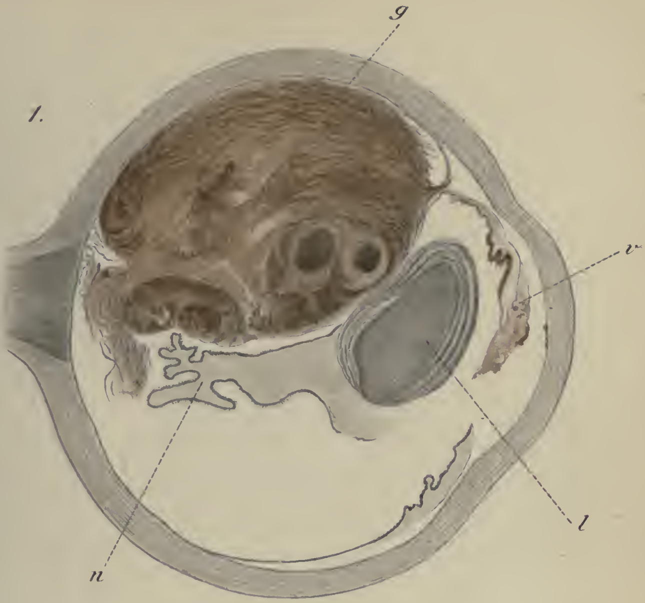

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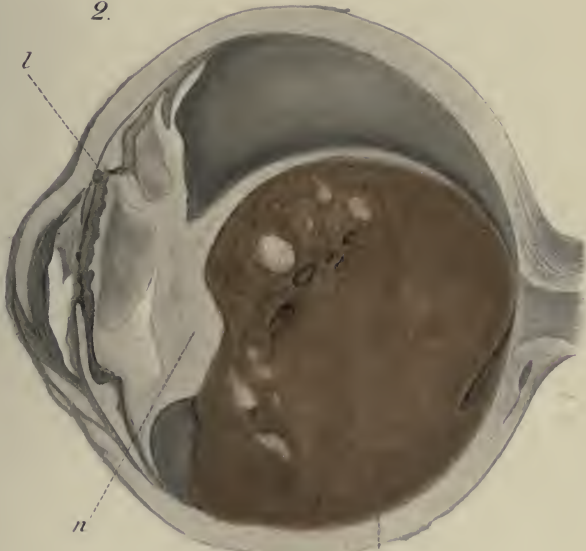

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